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J. A. MALLETT

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COVER PICTURE
An attractive springtime scene in the Forrest National Park

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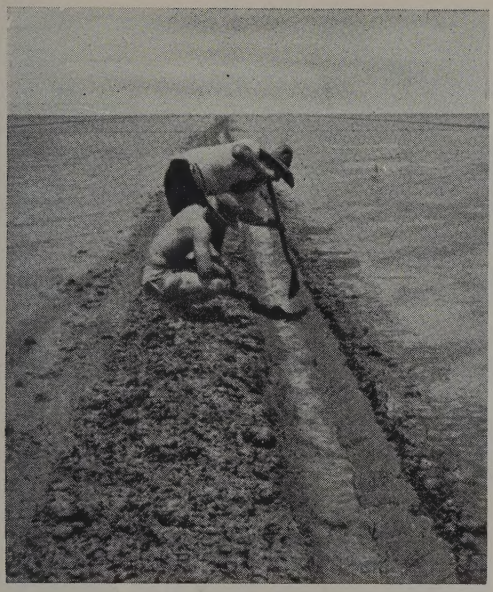

Fig. 1.—This photograph, taken in November, 1955, when workers were checking the depth of water penetration in the furrows, gives some idea of the bare conditions of the Cherrabun Plain

SOLVING PASTORAL PROBLEMS

By W. M. NUNN, B.Sc. (Agric.), Officer in Charge, North-West Branch

FOR many years, most of the Department of Agriculture's rural extension work—especially the application in the field of methods evolved and tested in small-scale experiments—was confined to the southern portion of the State. To be more specific, it was confined to the triangle formed by the south and west coastlines and a line running from a few miles north of Geraldton to the vicinity of Esperance.

Since the North-West Branch was formed within the Department of Agriculture, considerable progress has been made in taking extension work farther afield into the pastoral areas. The branch was created in 1950, and the first of our field workers can be said to have recognised and come to grips with pastoral problems in 1952.

The first success achieved was in the Port Hedland area where Hank Suijdendorp, now Regional Adviser for the district, was able to point the way towards arresting the decline of pastures resulting from continuous stocking practices. By introducing the principle of "deferred grazing" he showed how the waning carrying capacity of this country could be built up again.

He also demonstrated how, by "checkerboard ploughing," the extensive claypans on stations near the coast could be reclaimed and re-grassed after being completely bare for many years.

This work has been written up several times already in this Journal—see particularly "Station Management—The Value of Deferred Grazing" (September-October, 1954) and "Pastoral Research" (May-June, 1956). Reprints of these articles are available as Bulletins Nos. 2194 and 2356 respectively.

The first Departmental field day dealing with the solution of pastoral problems in this State, was held at Abydos Pastoral Research Station in April, 1954. Since then, the field day has been an annual event in the Port Hedland district and the venue has alternated between Abydos and Mundabullangana—a station which has been most co-operative in providing facilities for our research men and in applying their recommendations on a field scale.

Fig. 2.—This photograph, taken in May, 1958, shows field day visitors inspecting a reclaimed area of the Cherrabun Plain in the same area that was shown in Fig. 1

DEFERRED GRAZING

The deferred grazing principle is not of course a newly-devised one. It has been applied in America for years, and can be studied in American range management textbooks, but it had to be proved and demonstrated here before station owners could be convinced that it was sound for our conditions. What made it doubly important as an initial study was that research workers in other States had failed to obtain results and were inclined to doubt its application in this country.

There is little doubt now that it can be applied in principle over a number of different plant communities in our North-West and Kimberley pastoral areas. Minor variations, of course, will occur in practical methods to be adopted. In some areas an unpalatable invading species has to be disposed of before the desirable ones can be induced to return. In others it is necessary to break the hardpan surface to give seeds a chance to lodge and germinate.

But the principle of periodic deferment during the growing season appears basic to a wide range of types from Gascoyne to Kimberley.

MORE PASTORAL FIELD DAYS

The success which attended the initial work in the Port Hedland area resulted in an extension of pasture regeneration research, and ultimately to field day

Fig. 3.—Agricultural Adviser, K. Fitzgerald, addressing visitors on the 200 square miles of Coonoongoodie Plain. This area, which has been completely bare for many years, is now showing its first season's response to treatment.

Fig. 4.—Agricultural Adviser, J. Lawson, at the Woodleigh field day, addresses visitors grouped in a corner of the experimental area

activities in the West Kimberley and Lower Gascoyne districts. This year has witnessed some notable advances.

In May, a two-day meeting took place on Gogo and Cherrabun Stations, two Emanuel Bros. properties in the Fitzroy Crossing districts. This was the first gathering of its kind in the Kimberley division and the response was most gratifying.

Visitors were able to inspect some thousands of acres of grasslands recovered by a few years of good management after having been continuously bare for many years. Part of this area consisted of Departmental trials where lines of buffel grass had been planted in furrows to inaugurate the recovery processes but had been themselves replaced after a few years of deferment by the native Mitchell and rice grasses moving in from surrounding areas. On the lighter soil types, buffel and Birdwood grasses remain as permanent members of the perennial grass community. On heavier soils they do not do well, but have been sown because the seed is readily available, and because even small beginnings of any type of plant growth contribute materially to build-up of soil, seed and water penetration to

Fig. 5.—Another snapshot at the Woodleigh field day. Note the heavy growth of windgrass and mulla mulla on the experimental area. Perennial grasses have re-appeared in small numbers and should multiply with further deferred grazing. Outside the fenced area, the country carries only sparse vegetation

enable the native perennials to return in force.

In addition to the Departmental trials, visitors inspected the Coonoongoodie area where Emanuel Bros. have undertaken a huge project of fencing and furrowing to protect and regrass an area of approximately 200 square miles.

In September last, a field day was held at Woodleigh Station, just inland from Shark Bay and about 100 miles South of Carnarvon.

Here the country is fairly densely populated with acacia scrub. The taller, less accessible acacias have become denser in recent years, and progressively less is seen of the grasses and smaller edible species of scrub which provided former carrying capacity.

In a region which had been cleared by burning the dense acacia, an area was fenced and deferred during the growing season. Subsequently grazing was permitted and this was successful at a rate which made better use of the feeds than elsewhere under continuous grazing. The response is most pronounced in comparison with outside areas, and it seems that the deferment technique will produce worthwhile improvement here.

The immediate gratification however, is in the response among local pastoralists. Practically all near neighbours were present, and they came knowing that investigations were only at the commencement stage.

The atmosphere of friendly co-operation and constructive criticism was most inspiring to both the agricultural officers and owner-manager Mr. J. Thomson, whose combined efforts had led to the trials and the organisation of a field day, which now looks like becoming an annual event in the Shark Bay area.

NEW FRUIT FLY BAITS

Two new formulas for fruit fly bait have been recommended by the Department of Agriculture following upon experiments carried out by the Government Entomologist.

Announcing this, the Minister for Agriculture (Mr. L. F. Kelly) said that the new formulas contained malathion and were based on American preparations which had proved successful.

He said that the recommendation of sodium fluosilicate, as given on the back of the Orchard Registration Certificate and in the leaflet dealing with Mediterranean fruit fly, still stands but the malathion preparations were likely to give improved control.

The first new formula was—

Fifty per cent. malathion emulsion—4 oz.

Sugar—2½ lb.

Water—4 gals.

In the second new formula, 2 oz. of Protein Hydrolysate of Yeast was used instead of the 2½ lb. of sugar. It was pointed out, however, that supplies of yeast were limited and it was not readily available on the local market.

Both preparations are to be used as foliage baits in the same way as recommended for sodium fluosilicate, and should be applied every six days. The malathion could be recommended to both commercial growers and householders as an alternative to sodium fluosilicate.

There is quite a difference in relative costs. During the field trials last season the cost of the normal sodium fluosilicate was £2 7s. 3d. per 100 gallons, the malathion-yeast bait was approximately £4 5s. per 100 gallons. However cost would not be a factor if greatly increased control of fruit fly is obtained. A commercial firm has marketed a fruit fly bait in powder form consisting of malathion and yeast. This bait contains malathion as a wettable powder which could cause spotting of the fruit, if carelessly used. Moreover it must be noted that the strength recommended by the Department is twice that contained in the recommendations given on the label.

When used with normal precautions and in accordance with the instructions, malathion should offer no danger to operators or consumers. As with fluosilicate it is advisable to wash all sprayed fruit before eating.

INFECTIOUS PNEUMONIA OF PIGS

By C. R. TOOP, B.V.Sc., Chief Veterinary Surgeon

COUGHING is so common among pigs that it seems almost to be regarded as a normal condition. Some pig-raisers will tell you that it is caused by worms, or that their pigs have been eating dry feed or running in dusty yards, but there are many who do not realise that it is a symptom of a highly infectious disease that is making heavy inroads into their profits.

Infectious pneumonia as this disease is called seems always to have been widespread in the pig population of Western Australia, and more than 30 years ago, an attempt was made to eradicate it by the quarantine of affected premises and the sale of the pigs for slaughter.

The cause of the disease and the manner of its spread had not, however, at that time been determined, and had it been known that an infection which could be carried for a long period by the apparently healthy pigs purchased as replacements was responsible, it would have been appreciated that a policy of eradication based on quarantine and slaughter was bound to end in failure.

ACUTE AND CHRONIC FORMS

Infectious pneumonia occurs both as an acute and a chronic disease, but the chronic form is by far the more common. The acute disease is most often seen in young pigs, particularly weaners and slips which show symptoms of listlessness, high fever, laboured respiration and coughing. The mortality rate may be high and death may occur within a few days of the onset of the symptoms. Animals that survive are slow to recover and often remain stunted and unthrifty.

In the chronic form of the disease, the predominant symptom and often the only symptom observed, is a dry spasmodic cough which can usually be provoked by forced exercise. Some affected pigs are "bad doers" and fail to thrive, but more often than not—apart from coughing—they show no apparent abnormality. However, even in these cases—and they are the majority—growth is retarded and a longer period and more food are required to bring the pigs to marketable weights. At post-mortem examination, the principal changes are found in the thorax or chest cavity. The affected lungs contain more or less extensive pneumonic areas which are firm and solid in consistency and dark red or sometimes greyish in colour, and are clearly demarcated from

the healthy lung tissue which is pink and spongy. Some cases show evidence of pleurisy, and the lungs are firmly adherent to the chest wall.

A VIRUS INFECTION

This disease is caused by a virus, and it has been transmitted experimentally by workers in Great Britain by the introduction of bacteria-free filtrates prepared from pneumonic lungs into the respiratory passages of healthy pigs. It had been thought until quite recently, that a mixed bacterial infection was responsible, but it is now known that these bacteria are merely secondary invaders, and while they cannot produce the disease in the absence of the virus, they do increase its severity.

The infection is airborne and is spread in the droplets of moisture expelled by diseased pigs when coughing.

Infectious pneumonia may be introduced into a piggery by the purchase of infected breeding stock or of infected store pigs, and once established, it is likely to persist indefinitely.

Recovered pigs although apparently healthy, continue to harbour the virus for long periods, and this is illustrated by the large number of pigs showing pneumonic areas in their lungs when slaughtered at bacon factories. Breeding sows with these lesions remain carriers of infection which they in turn, transmit to their litters, and store pigs may transmit and perpetuate the disease in a piggery in the same manner.

BAD MANAGEMENT FAVOURS DEVELOPMENT

Conditions which lower the resistence of young pigs to infection favour the development of the disease. Exposure to wet insanitary conditions, cold draughty quarters and poor feeding, all have this effect, and because of it, infectious pneumonia is more often a serious problem in piggeries where management is unsatisfactory and feeding is inadequate.

TRIALS DEMONSTRATE LOSSES

The economic loss resulting from the disease was clearly demonstrated in some trials conducted in England a few years ago, in which growth rates and the efficiency of food utilisation were investigated. In one of these, 16 eight-weeks-old weaners were paired into two even groups and kept under identical conditions of management, housing and feeding until they reached a liveweight of 200 lb. One group was artificially infected with the virus of infectious pneumonia, while the second served as a normal healthy control.

Growth rates in the healthy group were remarkably even. They gained 1.29 lb. per day and consumed 3.39 lb. of food per 1 lb. liveweight gain. By contrast, the infected group grew irregularly. They gained only 1.1 lb. per day but required 4.25 lb. of food for each 1 lb. of liveweight gain. The efficiency of food utilisation was thus 25 per cent, better in the pneumonia-free group.

In a further and more comprehensive series of trials, it was revealed that growth rates in infected pigs were reduced by 16 per cent., and the efficiency of food conversion by 22 per cent. Based on these findings and the observation that about 50 per cent. of the pigs slaughtered at abattoirs showed pneumonic areas in their lungs, it was estimated that the cost of infectious pneumonia to the pig industry of Great Britain was £15,000,000 per year. These figures illustrate the serious nature of the disease and stress the need for its control and eventual eradication.

CONTROL

The control of infectious pneumonia resolves itself into a question of efficient management with the emphasis on housing and feeding.

Sties and shelters need not be elaborate, but they should be warm, well-ventilated and free of draughts, and the floors should be above ground level so as to avoid dampness and cold. The ration fed should be adequate both in quantity and quality, and should not be lacking in protein, minerals and vitamins. Vitamin A is important and in the absence of greenfeed, the diet should be supplemented with a shark liver oil preparation.

By increasing the resistance of the pigs, these measures will minimise the effects of the disease, but they will not prevent the spread of infection or eliminate losses. This can only be achieved by total eradication.

COULD BE ERADICATED

Recent research in Great Britain has shown that infectious pneumonia can be eradicated and that a herd once freed of the disease, will remain free provided the infection is not re-introduced.

Breeding sows must be segregated and their litters reared in complete isolation in buffered enclosures. Any litters that develop symptoms of coughing are rejected, and together with the sow are sold for slaughter. Litters which remain healthy and show no evidence of coughing are carried to baconers when the barrows are slaughtered and their lungs carefully examined. If no evidence of pneumonia is detected, it may be safely assumed that the gilts are free of infection and they may be retained as breeding sows and will form the nucleus of a pneumonia-free herd. Their progeny will replace the balance of the pigs on the property which must be disposed of to the best advantage for slaughter.

Infectious pneumonia is so prevalent in Western Australia that its eradication and the replacement of the present affected herds by healthy stock, would present the greatest difficulty, and it could only be regarded as a long-range project. However, the advantages to be gained from increased growth rates and greater efficiency of food conversion are so obvious that it deserves the closest consideration.

The establishment of a few pneumonia-free herds to begin with, would provide a source of healthy breeding stock, not only for the new breeder entering the industry, but also for the established pig-raiser who had decided upon a policy of eradication, and once under way, it might be expected that the movement would grow and expand.

(From an A.B.C. Country Hour broadcast.)

FOX SCALP BONUS ABOLISHED

The Minister for Agriculture (Mr. L. F. Kelly) advises that he has approved of a recommendation that the bonus of 4s. at present being paid on fox scalps should be abolished in Western Australia after December 31, 1958, for a trial period of three years. The expenditure saved (about £10,000 a year) will be used to obtain poisoning units and to organise drives against foxes in agricultural areas. The experiment was suggested by the Protection Board over two years ago and was supported at the time by the Farmers' Union of W.A. The support of the Road Board Association of W.A. has now been given.

It has been evident for several years that the bonus payments—which have ranged from £2 to 2s. 6d.—have had little or no control over foxes and 50,000 scalps were received in 12 months a few years ago.

To show the advantages of organised poisoning, the Protection Board arranged demonstration drives in various parts of the agricultural areas. They were supported by two poisoning units which operated on unoccupied land as well as assisting in organisation and instruction on baiting methods.

The success and popularity of the drives and the poisoning units has been amply revealed by the many requests for further or extended operations, as the demonstrations have convincingly shown that lamb killing can be almost eliminated by poison baiting.

Four more units are being ordered immediately to assist in operations during the coming summer.

Mr. Kelly said that relatively few fox scalps are received from pastoral areas which therefore are not greatly affected by the decision. Baiting drives already conducted or assisted by the Protection Board to destroy wild dogs in the pastoral regions are known to have a considerable controlling effect on foxes.

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VEGETABLE GROWING AT CARNARVON

A Summary of Vegetable Trials at the Gascoyne Research Station 1957

By J. A. LAWSON, B.Sc. (Agric.), and R. A. REES, B.Sc. (Agric.),
Agricultural Advisers

THE Gascoyne district is no longer entirely reliant on bananas for its income. "Out of season" vegetable growing has obviously come to stay, but to-date only a few varieties of vegetables have been grown commercially, the principal ones being runner beans, followed by tomatoes, cucumbers, rock melons, pumpkins and capsicums in that order. To reduce the possibility of a glut of these lines, the Department of Agriculture at Carnarvon has conducted a series of trials on many other vegetables which could have commercial possibilities if grown out of season in the district.

We consider that the most important of these would be onions, and despite several setbacks, we are confident that the Carnarvon district will be able to supply fresh brown and white onions to the Perth market as from August each year.

Fig. 1.—Runner beans are one of the principal crops

A set pattern is adopted for each particular vegetable type investigated. Plantings were made at regular intervals for the purpose of determining the best marketing period for each. Regular spraying, according to Departmental recommendations, was carried out to combat diseases and pests.

The following is a description of vegetable trials carried out at the Gascoyne Research Station in the 1957 season, together with comments on commercial possibilities and observations from private plantations.

ONIONS

Seasonal shortages of onions are a regular feature of the Perth vegetable markets. Whites are absent from the market from May until the end of August, when the early flats reappear, and browns are usually imported from July to early October.

In the Perth area, onions are planted in March-September, and harvested in November-February. They are then stored and sold over a period of several months. By the end of June the percentage of losses from storage rots becomes excessive; this necessitates continual sorting and eventually all remaining onions must be cleared.

The onion is a very hardy plant, but at the same time is sensitive to some environmental conditions such as temperature and day length.

When the standard varieties used in the Perth area were tried at Carnarvon during 1956 and 1957, few showed any promise, and most stayed in the ground for nearly 12 months without forming bulbs. This was apparently due to the difference in day length in the two areas, the days being somewhat shorter at Carnarvon as onions are maturing in the winter period.

Some onions that showed promise, were obtained from Fitzroy Crossing, in the Kimberleys. This was a very mixed lot of seed, showing many colour variations, from white to brown, and the shape was also variable, the majority being flattened globes. However this "variety" had been selected for earliness, and was the only onion to show promise from those tried in 1956-57.

Also tried in the district by some of the local growers, were some of Yates seed—Selection 105 (Lockyer Brown). This seed showed distinct promise, being of good globe shape and very early maturity. Some variation in colour was evident.

Seed selection is being carried out with the most promising varieties at the Research Station, but this is a long-term project as the onion can be considered a biennial—two years from seed until more seed is produced.

Together with the search for the right seed to suit the district, work is also going forward to study the correct cultural practices for onions in the Carnarvon district.

Three main problems were encountered in the onion crops grown in Carnarvon during the 1957 season—

Advanced Maturity.—The Yates seed "Lockyer Brown" (Selection 105) where sown in seed beds, produced a very high percentage (50 per cent. or greater) of mature bulbs an inch or less in diameter, within 6 to 8 weeks of the seed being sown. With seed costing £7 to £8 per lb. this defect was very costly to the growers. This problem is not encountered in Queensland, and locally-produced seed may be free from this trait.

"Bolters"—the production of seed heads in the onion crop, rendering the bulbs unmarketable.

Last year "Lockyer Brown" and "Fitzroy Crossing" seed, where drilled in early February and "thinned" at a later date, produced good sized onions with a complete absence of bolters. Later plantings were all transplanted and produced up to 90 per cent. bolters. The extreme cold experienced last year could have been responsible for this phenomenon.

One particular instance was recorded where onions planted on either side of a furrow, running east and west, produced four times as many bolters on the northern bank as occurred on the southern bank, which receives less sunlight.

Temperature appeared to be the main reason. Where comparatively warm weather was experienced, during the growing season, few "bolters" appeared.

Thus to avoid this trouble, plantings would have to be early, i.e., January or February, to avoid the cold normally expected during late June, July and August.

If day length is important, the onion would also require early planting to avoid maturing when the length of day was increasing.

"Doubles"—the division of a partly-matured bulb into two or more portions, each of which forms a bulb of irregular shape, and of no commercial value.

The tendency of an onion to double or split, is controlled by its suitability to the area in which it is being grown, and also by cultural practices.

All the onions suited to a longer day length, when grown at Carnarvon, exhibited a considerable number of splits. The more promising varieties for the district also split, where incorrect maturial practices were followed, i.e., heavy applications of nitrogenous fertilisers applied at bulbing.

The "Lockyer Brown" variety was notable with respect to splits, in that it was hard to tell a "split" at maturity; for the several portions each formed an almost perfect onion.

Onion Trial Results.

An irrigation trial last year at the Gascoyne Research Station, to study onion growing by flooding on the heavier Gascoyne soils, showed many interesting sidelights. Flooding was by three methods:—

(a) Onions planted in 6 ft. bays.
(b) Onions planted on the water line on both sides of a furrow.
(c) Onions planted on narrow ridges and watered from either side.

Fig. 2.—Portion of the onion trials

Yield.

(a) Produced the heaviest yield per acre, due to the higher plant density, but onions were small.

(b) Lighter yield per acre than (a), but with a better sized onion.

(c) Lighter yield than (a) and (b), with slightly smaller onions.

Observations.

(a) Spacing 6 in. x 3 in. with five rows per bay caused stunted growth in the centre rows.

Packing of the soil, due to repeated floodings, caused distortion of shape of bulbs.

Unless the bays were perfectly level (a practical impossibility over large areas), localised spots of retarded growth were present in any depressions.

(b) This method was easiest to prepare, weed, water, etc., but the bulbs tended to be too large and, again, there was some distortion in shape.

(c) Appeared to be the most suitable method, producing bulbs of excellent shape and all being very even. However, the yield per acre was the lowest for the three methods, and the land preparation requires the most work. However, this method would offer the best prospects for sowing in drills and thinning later.

The onion seed is small and requires a fine seed bed tilth to germinate. This condition is best obtained by method c, whereby water does not overflow and compact the soil.

Prices have varied somewhat during the period under trial, so it is difficult to assess the prospects for expanding Carnarvon production. There would certainly be scope however, for a few growers to specialise in the production of a White Globe onion for the June, July, and August period.

RHUBARB

This crop was planted from crowns obtained from Perth and came to maturity in 10 to 14 weeks from planting. It was grown on the usual Carnarvon furrow irrigation system, and produced well. Based on plot yields, and using furrows at 5 ft. centres, the production rate was 12 tons per acre of marketable stalks.

Samples were sent to the Metropolitan Markets for inspection and sale, and were described by the Market Trust Inspector as being equal to the best on the market at that time. The most lucrative marketing period was August and September, when up to 1s. 3d. per lb. was obtained. At an average price of approximately 9d. it would seem that the financial return from this crop would be considerable, but it must be remembered that commission, freight, bags, fertiliser and watering costs must all be deducted, so that the deciding factor which determines whether or not

the crop will be an economical prospect, is the price which the prospective grower must pay for planting materials.

Crowns obtained by the Department for the trial proved quite costly, approximately 1s. each. However, in the gardens in the metropolitan area, it is customary for growers to obtain crowns from their neighbours at no cost at all provided that they do the digging themselves. It is possible, therefore, that some growers could get cheaper material from friends or relatives in the metropolitan gardens. Unfortunately, it seems almost impossible to carry a rhubarb crop through the Carnarvon summer, since the crown rot disease invariably destroys all the plants.

In the metropolitan area, rhubarb is regarded as one of the cheapest crops to grow, and there is no doubt that an excellent sample can be produced in the Carnarvon district if crowns are planted in May-June. It is easily handled by comparison with beans, but considerable care is necessary in packing, to make sure that the bundles of stalks are tight before they are put into bags or boxes. Marketing after September would be a doubtful proposition because the stalks rapidly go limp in the heat, after being cut.

It is considered that the crop would be quite a lucrative prospect for a small number of our growers.

SWEET CORN

Many inquiries have been made by Carnarvon growers about the commercial aspects of sweet corn production for the out of season Perth market. Most planters know that the crop grows vigorously under our conditions. At the Gascoyne Research Station two good varieties of sweet corn were planted at intervals. Commercial-sized samples were sent to the Perth Market, when matured, where their quality was considered to be good. However, for the very best of the consignment no more than 4s. 6d. to 5s. per dozen cobs could be obtained.

When production per acre and production costs per acre were worked out to determine the economical possibilities of the crop, the result was somewhat disappointing.

Production rate of the Research Station crop, once again using our furrow system with two rows per furrow, the furrows 6 ft. apart, was 1,000 dozen approximately per acre. This would mean that a grower would only net between £160 and £190 per acre.

Obviously the crop could not be contemplated as a part of our regular vegetable programme. However, if the corn was grown as a cover crop in place of maize, and harvested before the plants were turned in, it might not be such a poor prospect.

SWEET POTATOES

The 1957 trial was planned on the basis of the encouraging results achieved in the 1956 crop. Unfortunately, the first plantings were delayed by two months, since planting materials of the commercial varieties being used were late coming from Queensland. In 1956 sweet potatoes planted from local runners in March, were ready for harvest in September. Since they were a poor type of tuber, planting material was ordered from Queensland for the next series.

The 1957 plantings, after being made considerably late in the year, then received further setbacks, the major one being the extreme cold experienced in July. During this month Carnarvon received seven nights of frosts, which was most unusual. Prolific leaf and runner growth was made by the plants but no tubers formed until January, 1958. From the marketing point of view, the best months for maturing fresh sweet potatoes are from September to January. The only other sweet potatoes available at that time are storage tubers from metropolitan gardens, which do not compare with the fresh article.

For the 1956 samples, up to £100 a ton was received, but it would seem that prospective growers should be most cautious in wasting too much money and effort on the crop, due to its very adverse reaction to extreme winter cold.

CELERY

It was hoped that this crop would be a good prospect, particularly for the local and northern "early summer" market. However, it seems that this district never produces a good quality sample, due to climatic conditions.

Fig. 3.—Harvesting the potato plots

The celery is very slow to germinate and grow, and its weaknesses soon become obvious when the Carnarvon spring arrives, accompanied by hot easterly winds. Despite the fact that regular seasonal plantings were made, the stalks could not be matured properly before January. Due to extreme heat their quality was vastly inferior to anything obtained from the metropolitan gardens.

POTATOES

The main object of this trial was to determine the length of the period over which good tubers can be produced in Carnarvon conditions, and to be sure that adequate control of early blight and potato moth can be effected over this period.

It was found that planting times were determined by the climate. If planted before late July there is more possibility that the young plants emerging will be destroyed by frost, and plantings made later than early September will most likely yield very poorly, due to the rising temperatures. Potato plantings made during summer in Carnarvon, rarely produce any tubers at all.

From late July and early August plantings, yields of 12 to 1 by weight of good quality tubers, were harvested. From early September plantings, 4 to 1 ratio was obtained together with a very noticeable decrease in quality. With regard to early blight and potato moth, the former was completely controlled by Zineb sprays. The potato fly was completely controlled in the early plantings only. In our September plantings, 20 per cent. of the tubers were damaged, despite regular spraying.

It is obvious that only a very limited number of growers could contemplate planting this crop for local sales.

GLADIOLI

A number of inquiries were received regarding the possibility of air-freighting gladioli to Perth during the late winter, when they are moderately scarce in the metropolitan area. The trial was conducted at the Gascoyne Research Station once again, involving varieties and time of planting, and the economic aspects of production.

First, it must be pointed out that to buy sufficient corms to plant an acre of gladioli, the cost would be prohibitive. The first object of any commercial grower is to build up his corm numbers by planting out, each year, the increasing number of tiny cormlets from the previous year and harvesting the resulting yearling corms, which can be brought into full production the year after. This is the only way the crop can be grown economically. It entails careful storing of corms each year, with dusting, to prevent corm rots and preferable with reduced temperatures to prevent breakdown in the hot weather.

Some excellent spikes were produced in our trial and samples were air freighted to Perth on a number of occasions. The probable contract price which florists would be prepared to pay for the quality of the article produced, would be 4s. to 5s. per dozen. This means that the crop could never become very lucrative, but may later be regarded as a useful side-line for a small number of growers. The only suitable planting times under our conditions are April and May.

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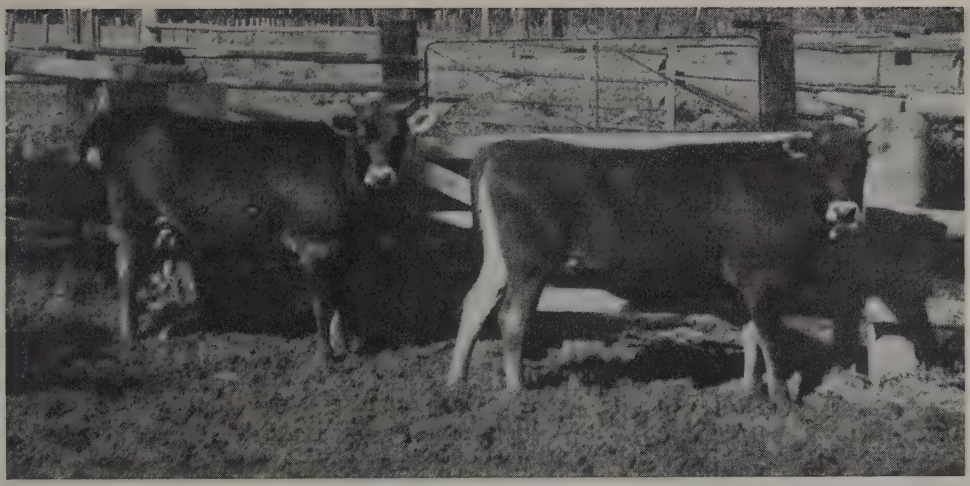

A pair of identical twin heifers at the Bramley Research Station

TWIN CALVES AND INFERTILITY

How Freemartins Occur

By F. C. WILKINSON, B.V.Sc., Veterinary Surgeon

FARMERS whose cows have given birth to twin calves, frequently write to the Department to inquire whether such twins can be expected to breed—in other words, whether they should be retained as potential herd replacements or whether they should be sold as vealers or fattened for the butcher.

Some farmers apparently believe that all twins—irrespective of their sexes—are likely to be sterile. Others think that all female twins are sterile, irrespective of whether they are born as a pair of heifer calves or as the female half of a bull-heifer pair.

In actual fact, where twins are both of the same sex—two heifers or two bull calves—they should be perfectly normal.

It is only when twins consist of a bull and a heifer calf that there is a risk of the female being unable to breed. In such cases, the bull calf should develop normally and could be used as a herd sire if necessary. The heifer calf of such a pair *could* be quite normal too, but in nine out of ten cases it would be what is known as a freemartin and would be unable to breed.

In general appearances, a freemartin tends to resemble a steer, or male castrated early in life. As it develops to the yearling stage it fails to come into season and there is usually a lack of the normal udder and teat development. Such freemartins fatten readily and should be sold to the butcher as soon as profitable.

Incidentally, this freemartin condition of infertility is observed only in cattle and does not apply in the case of sheep, pigs, dogs or horses.

WHY AND HOW

Some knowledge of the mechanics of reproduction in cattle is necessary to understand why twins of like sexes are normally fertile and why twins of mixed sexes may or may not produce freemartins.

The normal pattern of reproduction in cattle is that the "cow comes into season" at about 21-day intervals. During this period an egg cell or ovum which has reached full development in the ovaries

or egg-producing organs is expelled and passes down the oviduct or egg tube into the uterus or womb.

If the egg is fertilised by a male sperm at this stage it becomes the embryo which ultimately develops into a calf. During its period in the womb, the developing embryo is enclosed in a sac called the placenta. This sac is expelled during or after the birth of the calf and is usually referred to as the "afterbirth."

The placental sac contains fluid which protects the unborn calf from injury, and the sac itself serves as the connecting link between the mother and the developing foetus. It contains blood vessels and is attached to the calf by the navel cord and to the mother by cotyledons or attachments to the lining of the womb.

IDENTICAL TWINS

On somewhat rare occasions, the fertilised egg on reaching the womb divides into two parts, each of which develops into a calf. These two calves are contained in the one placenta or afterbirth and being evolved from separate portions of the same egg they are always of the same sex and are identical, or almost identical, in appearance and in general make-up.

These identical twins, whether they be two males or two females, should breed quite normally.

NON-IDENTICAL TWINS

In the great majority of cases, the cow sheds only one egg at each heat period. Other animals, such as pigs, dogs and cats, shed a number of eggs and eventually give birth to litters of young.

On occasions, however, a cow may expel two or more eggs from the ovaries at the same time and as a very large number of male sperms are introduced at each mating, each of these eggs stands a good chance of being fertilised and the result will be twin, triplet or even quadruplet calves.

In animals which normally have multiple births, each embryo develops separately from the others in its own placenta or afterbirth.

In the case of twin calves, however, the two afterbirths often unite in the womb and consequently the two calves are nourished and developed by a common bloodstream.

Where the calves are both of the same sex—two males or two females—this linking-up of the bloodstream has no ill-effects and the twins should be sexually normal with their breeding ability unaffected.

Where they are of different sexes, the sharing of the same bloodstream has the effect of preventing the full development of the female's breeding organs. It is believed that the male secretes a chemical substance which reaches the female embryo via the connected bloodstream in the placenta. This substance suppresses the development of the female reproductive system, especially the ovaries, which fail to grow into egg-producing organs. The female twin therefore becomes a freemartin.

The female does not apparently secrete any chemical potent enough to affect the bull calf which develops normally and is capable of breeding.

If the linking-up of the afterbirths does not take place and each twin develops independently of the other (as in normal multiple-birth procedure) both twins will be sexually normal, even though they may be of different sexes. In the case of cattle this is a comparatively rare occurrence and only about one twin heifer in every ten bull-heifer pairs is able to breed successfully.

Examination of the afterbirths immediately after the birth of bull-heifer twins will often furnish a guide to the breeding potential of the heifer. If the two membranes are entirely separate there is every chance that she will be sexually normal. If they are joined together she will almost certainly be a freemartin.

AUSTRALIAN TRACTOR TESTS

REPORT ON TEST No. 29

(Farmers' Edition)

ZETOR 25A DIESEL

(Tested for Motokov, Czechoslovak Export Corporation)

THIS Report is taken from the full Technical Report No. 29 of this test; test results are shown here in briefer form; fuller explanations are added. Values quoted here may be rounded out to two instead of three significant figures; to this extent the values quoted may differ slightly but not significantly from those shown in the Technical Report. Graphs of belt test performance, shown in the Technical Report, are not shown here. The Technical Report is not available in large numbers, but may be seen at the offices of the State Departments of Agriculture, the Bureau of Sugar Experiment Stations (Queensland), and the Commonwealth Department of Primary Industry.

1. THE TESTS

(1) After 12 hours of running-in, two types of tests were carried out, in order to measure the performance of the engine, as measured by the power in the belt driven by the belt pulley, and the performance of the tractor as a whole, as measured by drawbar pull, tractor speed, wheel slip, and drawbar horse-power (d.b.h.p.), with the tractor running on a bitumen test track.

The main results of these tests are given in Sections 2, 3, and 4. Other measurements and observations were made of various features of the tractor; these are given in Section 5.

(2) *Fuel Mixture Settings.*—The engine of this tractor has only one fuel-mixture setting, at which all the tests were carried out.

(3) *Governor Control.*—The engine was under the control of the governor set to give maximum power and full throttle at rated engine speed.

(4) *Fuel.*—Distillate, Diesel Index 56, Specific Gravity 0.842; weight per Imperial gallon 8.42 lb.

The Australian Tractor Testing Committee is a joint body established by agreement between the Commonwealth, the States, and the University of Melbourne ; under this agreement, the tests are carried out by the University of Melbourne. The address of the Tractor Testing Committee is : C/o. Department of Primary Industry, 301 Flinders-lane, Melbourne.

(5) *Specification.*—Engine No. 125-46071. For a brief specification of this tractor see Section 6 at the end of this report.

2. SUMMARY OF POWER OUTPUT

Table A

——	At the Belt	At the Drawbar
Rated engine speed, r.p.m.	1,800	1,800
Corrected maximum power(*a*)	24½	22½
Rated power (*b*)	21 (*b*1)	17 (*b*2)

(*a*) Corrected maximum h.p. is calculated by a suitable formula from observed maximum h.p. corrected to 60° F. and 29·92" (sea level) barometric pressure. No correction is applied to diesel engines because there is no suitable formula ; the values shown above are therefore the observed maximum powers.

(*b*) Engines are not expected to run indefinitely at full or maximum power output. But they can be expected to run continuously for some hours at *rated* output, which is less than maximum, defined as follows :—
(*b*1) Rated b.h.p. is defined as 85 per cent. of corrected maximum b.h.p.
(*b*2) Rated d.b.h.p. is defined as 75 per cent. of corrected maximum d.b.h.p.

3. BELT TESTS

The belt tests show the power (belt horse-power, b.h.p.) that the tractor may be expected to deliver when driving a machine by the belt.

Table B—Belt Test Results

As there is only one fuel setting, no mention will be made of mixture settings in this table.

	B.H.P.	Engine Speed	Fuel: Gall./hr. (*c*)	Fuel: lb./b.h.p. hr. (*d*)
1. Rated engine speed, 1,800 r.p.m.				
2. Fast idling speed about 2,140 r.p.m.				
3. Observed maximum b.h.p. rated speed	24·5	1,800	1·73	0·62
4. Corrected maximum b.h.p. rated speed (*a*)	24·5	No correction made for diesel engines		
5. Calculated rated load (*b*1)	21			
6. Test at approximately rated load	20·5	1,890	1·03	0·60
7. Average loading under governor (*e*)	14½	1,608	0·84	0·82
8. Equivalent engine torque at full throttle	71 ft. lb. at maximum power and rated speed 78 ft. lb. (maximum) at 1,100 r.p.m.			
9. Repeat of (3) above after 41 hours	23 h.p.			

(*c*) Fuel consumption in gallons/hour may be a simple unit, but it has no meaning unless we also quote the corresponding h.p. output.

(*d*) This is the "specific fuel consumption," the weight of fue consumed per unit of energy developed by the engine ; the unit of energy here is the h.p.-hour, similar to the electrical "unit," the kilowatt-hour. When this figure is least the engine is giving its best economy or efficiency. It is easy to change from column (*c*) to column (*d*) in Table B, e.g., in line 3 as follows :—
1·73 galls./hr. while developing 24·5 h.p. means 1·73 ÷ 24·5 galls./b.h.p./hr. = 0·071 gall./b.h.p./hr.
0·071 gall./b.h.p./hr. x 8·42 lb./gallon for this fuel = 0·61 lb./b.h.p./hr., as shown in column (*d*).

(*e*) Line 7, Table B, represents the average performance one might expect from the engine while driving a variety of belt loads, from light to heavy. In terms of average fuel consumption, it means about 6–7 pints an hour.

4. DRAWBAR TESTS

(1) The following tables C, D, and E, show the drawbar performance of the tractor, on the bitumen test track, wearing rear tyres 11.25 x 24, carrying standard weight (1,480 lb. front, 3,650 lb. rear; total 5,130 lb.), working in the gears named in the tables. Height of drawbar 15 inches.

Drawbar tests, using reduced weight, were carried out, but are not reported here.

As there is only one fuel setting, no mention will be made of mixture settings in the following tables.

Table C.—Maximum Power, Rated (3rd) Gear

	DBHP (*f*)	Pull lb.	Speed m.p.h.	Wheel Slip % (*g*)
1. Rated engine speed, 1,800 r.p.m.				
2. Observed maximum d.b.h.p. at rated engine speed	22·6	1,700	5·0	4
3. Corrected maximum d.b.h.p. at rated engine speed (*a*)	22½	No correction made for diesel engines		
4. Calculated rated load (*b*2)	17			

Table D—Pull at Maximum d.b.h.p.

All gears, rated engine speed. See note (*h*).

Gear	D.B.H.P.	Pull lb.	Speed m.p.h.	Wheel Slip %
1	16	3,300	1·8	20
2	20	2,400	3·2	8
3	22½	1,700	5·0	4
4	22¾	1,200	7·1	3½
5	22¾	750	11·4	1½
6	Road gear, not tested			

(*f*) D.B.H.P. is the product of pull (lb.) and speed (m.p.h.) divided by 375.

(*g*) Wheel slip can be measured by noting that, in travelling a given distance, the back wheels make more turns when working under load than when running with no load on the drawbar. The difference in these revolution counts divided by the former count gives the slip as a ratio, which can be written as a percentage.

(*h*) These are not the maximum pulls available in the gears (i.e., not the maximum sustained pulls), but the pulls at maximum d.b. power, i.e , at full-throttle at rated engine speed.

Table E—Fuel Consumption, Various Loads, Rated (3rd) Gear

Pull lb.	Speed m.p.h.	DBHP	Per cent. of Maximum d.b.h.p.	Slip %	Fuel	
					Gall./hr.	lb./b.d.h.p. hr.
750	5·7	11	48	3	0·7	0·72
950	5·5	14	61	4	0·8	0·70
1,200†	5·3	17†	75†	5	0·9	0·66
1,500	5·2	21	92	5	1·1	0·61

† The rated drawbar load.

(2) *Interpretation of Drawbar Tests.*—(i) Drawbar tests are carried out on a hard prepared surface. Most field conditions present higher resistance to the tractor's motion, so that, in the field, the maximum drawbar pulls available in any gear will usually be less than those shown in the tables.

(ii) Wheel slip may also be greater in the field; to that extent tractor speeds in miles per hour in the field will be less than those shown in the tables.

(iii) Because of (i) and (ii) above, the drawbar horse-power available in any gear in the field will usually be less than those shown in the tables.

5. OTHER OBSERVATIONS

(1) *Duration of Test.*—41 hours including running-in.

(2) *Repairs and Adjustments.*—The test tractor had been idle some six months in transit. Evidence of slight damage due to rust was noted on some parts of the injection equipment and among the stock of spares shipped with the tractor.

Before the belt tests it was found necessary to reset the sealed fuel pump to obtain optimum performance with local distillate fuel.

(3) *Engine.*—

Radiator water used—negligible.

Lubricating oil—type used, S.A.E. 30.

Weight to engine, 15.1 lb.

Weight from engine after tests, 13.7 lb.

(4) *Tractor Weights (lb.).*—

——	Front	Rear	Total
Minimum weight, unballasted	1,480	3,380	4,860
Added weights	Nil	270	270
Weight, as usually supplied	1,480	3,650	5,130
Water ballast	Not recommended		
*Standard weight	1,480	3,650	5,730

* Weight used in drawbar tests. This weight less driver, was used in finding centre of gravity.

(5) *Wheels and Tyres.*—

Tyres	Front	Rear
Type	Rib	Open centre bar tread
Size	5·50 x 16 x 4 ply	11·25 x 24 x 6 ply
Pressure	26 p.s.i. ...	14 p.s.i.

(6) *Steering.*—With track widths, front 50″, rear 60″. Wheel base 75″.

Turning circles: Without brakes, 20′ L.H. 21′ R.H.; with brakes, 17½′ L.H., 17½′ R.H.

Comment: Easy to steer under load, sensitive to steering wheel.

(7) *Centre of Gravity,* with tractor in standard weight condition with driver—1″ above, 22½″ forward of rear axle.

(8) *Driver's Accommodation.*—Access to seat: from back, and step at front of left rear wheel. Foot-room and support: adequate, flat floor. Comfort: spring seat, adjustable fore and aft, back rest. Accessibility to controls: clutch and brake pedals 19″ apart, centre to centre, pedal treads approximately 9″ below loaded seat. All controls conveniently placed and easy to operate. Foot throttle for use with road gear.

(9) *Instruments.* — Clearly marked (metric units). Indications were consistent throughout tests.

(10) *Inspection of Engine and Transmission after Test.*—After testing, the tractor was partly dismantled and inspected and found to be in a satisfactory condition.

(11) *Instruction Books.*—Owner's manual in English is adequate and well illustrated.

(12) *Tools and Spares.*—Standard accessories with each tractor include box of tools and set of spares.

G. H. VASEY,
Officer in Charge Tractor Testing.

W. F. BAILLIE,
Tractor Testing Officer.

University of Melbourne.

24th October, 1957.

6. BRIEF SPECIFICATIONS: Zetor 25A Diesel

(Based on Information Supplied by Manufacturers)

(1) *Engine—Zetor,* Serial No. 125-46071.
4-stroke; 2 cylinders, vertical; crankshaft along tractor; indirect injection.
Bore, 4.134"; stroke, 4.724"; compression ratio, 18 : 1.
Rated speeds: Belt work 1,800 r.p.m.; drawbar work, 1,800 r.p.m.
Fuel type: Distillate.
Fuel system: 2-cylinder pump and injectors. Two filters with replaceable elements. Tank capacity, 10 gallons.
Air Cleaner: Oil bath, centrif. precleaner.
Governor: Centrifugal.
Electrical system: 12-volt.
Starting: Electric glowplugs, decompressor on inlet valves.
Cooling: Water—fan, pump, thermostat, radiator blind.
Exhaust: Baffle-type muffler fitted.
Lubrication: Gauze and laminated paper filters.

(2) *Chassis—*
4-wheel; frameless; pneumatic tyres.
Wheel base, 75".
Track width: Front, 48"-60" x 6 steps; rear 47"-60" any width.
Tyre sizes: Front 5.50 x 16; rear 11.25 x 24.
Steering Gear: Single worm.
Weight: Maximum weight, 5,130 lb. (see Other Observations, part 5).

(3) *Belt Pulley—*
Left side, rear working, anti-clockwise.
Diameter 9.8"; face width 5.5". Speed (at rated engine speed), 1,230. r.p.m.
Belt speed (at rated engine speed), 3,160 ft./min., in accordance with overseas standards (namely, 3,100 ± 100 f.p.m.).

(4) *Power Take-off—*
Rear, left of centre, clockwise.
Speed: 600 r.p.m., not in accordance with overseas standards (namely, 536 ± 10 r.p.m.). At engine speed 1,600 r.p.m. P.T.O. speed would be 533.
Dimensions: 6 spline, $1\frac{3}{8}$" diameter.

(5) *Drawbar—*
Swinging, 15", 16", 17" high, adjustable. Trailer hitch fitted 27" above ground. Linkage drawbar optional.

(6) *Transmission—*
Conventional gears, 3-speed and ratio change; differential lock.
Clutch: Single dry plate; 11" diam.
Gear ratios and road speeds (assuming no wheel slip) on 11.25 x 24 tyres, at rated engine speed, as advertised:—

Gear	1	2	3	4	5	6	R_1	R_2
Ratio	106·5	68·8	45·6	32·4	20·9	13·9	155	47
M.P.H.	2·3	3·5	5·3	7·5	11·7	17·6	1·6	5·2

(7) *Hydraulics—*
Gear pump driven from P.T.O. shaft; 1,100 p.s.i. pressure.

(8) *Three-point Linkage—*
Generally to B.S.S. 1841-1951, category 2.

(9) *Spark Arrester—*
Muffler fitted as standard equipment.

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INSECT Pests AND THEIR CONTROL

By G. D. RIMES, B.Sc., Entomologist

RED SPIDER CONTROL

(Preliminary Report of Experiments)

EXPERIMENTAL work was carried out in January, February and March of 1958, in order to test various insecticides and miticides for the control of red spider, Tetranychus telarius (L).

A fully replicated experiment was laid out using Westralia beans as the host plants. The following materials and concentrations were used:—

Metasystox—1 pint per 125 gallons.
Diazinon—4 pints per 100 gallons.
Trithion—1 lb. per 100 gallons.
Parathion 20%—1 pint per 100 gallons.
Mitox—2 lb. per 100 gallons.
Phosdrin—28 oz. per 100 gallons.
Malathion 50%—25 oz. per 100 gallons.
Malathion + Ovobane—25 oz. Malathion 50%, 1 lb. Ovobane, per 100 gallons.
Parathion + Shellamite—1 pint Parathion 20%, 1 lb. Shellamite, per 100 gallons.
Aramite 10% P.C.P.P.C.B.S. 5%—4 lb. per 100 gallons.

The statistical analysis of the experiment showed metasystox, trithion, and diazinon to be vastly superior to the other materials tested. These three materials were further tested on commercial crops with excellent results.

In view of the information yielded by the bean experiments, trials were also conducted into the control of red spider on apple trees. Metasystox, trithion and diazinon were applied with a Turbomist

Fig. 1.—Tomato shoot showing discolouration due to red spider injury

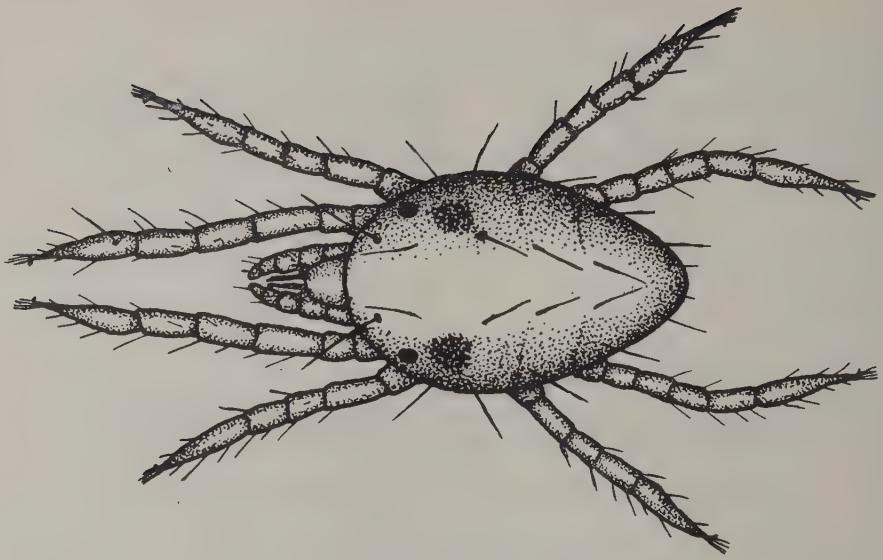

Fig. 2.—Adult male red spider x 200
(Univ. Flor. Exp. Sta.)

machine in a commercial orchard. This resulted in a very satisfactory control of red spider, whereas trees similarly treated with malathion were heavily infested.

Further work is planned for the coming season to fully evaluate these materials and to test other recently released miticides.

REFERENCES

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Jenkins, C. F. H. (1955) Insect Pests and Their Control. The Red Spider, Tetramychus *telarius* (L.), J. Agric., W. Aust., 4 (3) 2; 145-150.

FARMERS

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DOCK

(*Rumex crispus* L.)

A number of different species of Docks are weeds in many parts of the world. Their persistence is due mainly to their unpalatability, the production of large numbers of dormant seeds and the formation of a very strong tap root. Spasmodic cultivation serves to cut up the root and distribute the plant rather than control it.

WEEDS of Western Australia

By **G.R.W. MEADLY** M. Sc.
Officer in Charge, Weeds and Seeds Branch

DOCKS

(*Rumex* spp.)

SOME families of plants contain many members which are useful for various purposes while others are only of significance because of their undesirable representatives. The Polygonaceae or buckwheat family as it is sometimes called, does not fit neatly into either of these groups for, besides containing a number of cultivated plants, it also includes several very undesirable weeds.

Among its members is buckwheat, a plant that is not a true wheat, but is grown extensively in many countries including the United States, India and China. It is used as stock food and also for making a pancake flour, while honey from buckwheat flowers has always possessed a high reputation for flavour. In this country, rhubarb is a better-known useful representative of the family.

On the debit side there are several undesirable species. Doublegee (*Emex australis*) is one of our most widespread and troublesome weeds and the family also includes wireweed (*Polygonum aviculare*), and sorrel (*Rumex acetosella)* along with docks (*Rumex* spp.), the subject of this article. In all, five different species of docks have been recorded for Western Australia. The curled dock (*Rumex crispus*) is probably the most abundant but the fiddle dock (*R. pulcher*), swamp dock (*R. Brownii*), and clustered dock (*R. conglomeratus*) are plants which cause concern in a number of localities. The pink dock (*R. roseus*), grown for its attractive flowers has also become established beyond garden confines.

DESCRIPTION

The various species differ in detail but have many features in common. A brief description of the curled dock will give some impression of the group. A large, strong, tapering rootstock descending deeply into the soil gives rise to a stout, branched stem from one to four feet in height. The lance-shaped leaves, varying from six inches to one foot long, have waved and crisped margins. The small reddish or greenish flowers are formed in crowded whorls and seeds are produced in large numbers. Each seed is about one tenth inch in length, three-sided and tapering to each end.

SIGNIFICANCE

Some gastric disturbances have been attributed to docks when eaten in large quantities by animals and cases of dermatitis have been recorded, but the plants are not considered to be toxic. They are troublesome weeds of arable and pasture land as well as lawns, being capable of competing strongly with crop, pasture and lawn species. Besides depleting the available moisture and nutrients in the soil, they have a strong shading effect and tend to crowd out desirable plants.

CONTROL

Their control is made difficult by two features not uncommon to persistent perennial weeds—a strongly-developed

CURLED DOCK (*Rumex crispus* L.)

(a)—"Seed" natural size and x 6; (a^1)—Fruit x 4; (b)—First stage of seedling; (b^1)—Seed leaf; (c and d)—Second and third stage of seedling; (e) Flowering plant

(British Ministry of Agriculture and Fisheries.)

taproot, along with production of a large number of seeds, some of which may remain dormant for many years. Root fragments are capable of producing new plants.

Much research into the control of docks has been undertaken in many countries. No highly effective method has been evolved although good results can be obtained by systematic cultural and chemical treatments. Isolated plants should be grubbed carefully. Seedlings can be killed quite readily by cultivation but with mature plants having deep taproots, ploughing, in order to be effective, must be undertaken to a depth that will sever the main portion of the root. One or more subsequent cultivations are usually necessary to prevent the cut portions of roots from developing into new independent plants.

Docks are not highly susceptible to the hormone-like or 2,4-D herbicides but no more effective chemicals are known. The ester of 2,4-D is favoured and, under pasture conditions, spot spraying with a solution containing 2 lb. to 4lb. acid equivalent in 100 gallons of water per acre is recommended. The lower rate is sufficient for seedlings or freshly-rooted fragments but some regrowth from established plants can be expected even at 4 lb. acid equivalent per acre. Seedlings are most susceptible when small, but established plants are more vulnerable when flowering has just commenced. The 2,4-D preparations are not poisonous to stock but will damage clovers when applied at the rates suggested. For this reason and also because of the cost, a general application to pastures by means of a boom is seldom undertaken.

The ethyl ester of 2,4-D is the type in general use. With some New Zealand trials better results have been obtained with the Poly-ethylene glycol (PEG) ester of 2,4-D but so far this has not proved superior in local experiments. Some reports have favoured the butyric derivatives of 2,4-D and investigations are at present in progress with a view to evaluating the various preparations available.

Docks in a crop sown after effective ploughing are controlled more readily by means of chemicals. This is due to the fact that many of the plants are either seedlings or newly-developed from root fragments and also weeds generally are more susceptible when growing in a cereal crop than in a pasture. Quite good results without affecting the cereal have followed the application of 8 oz. acid equivalent of 2,4-D ester by means of a low-volume boom.

Whatever method is used, owing to the presence of dormant seeds, some further plants can be expected to appear over a period of years. These should not be allowed to mature and shed seed.

ALSATIAN DOG BAN

The Minister for Agriculture (Mr. L. F. Kelly) said recently that a number of unsterilised Alsatian dogs have been located in W.A. during the past few months. Most of these had been brought overland, and the owners expressed concern when told that the animals must be treated or destroyed.

People obtaining Alsatian dogs are reminded that no Alsatian or part-Alsatian dog may be kept in W.A. unless it has been effectively sterilised. The only acceptable proof of sterilisation is a certificate from a registered veterinary surgeon. As local authorities cannot register Alsatian dogs unless a certificate of sterilisation is produced, any dogs brought into this State unsterilised, will be picked up eventually. In some cases the dogs have been too old for an operation to be performed, and it has been necessary for them to be destroyed.

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PLANT DISEASES

BACTERIAL CANKER OF TOMATOES

By W. P. CASS SMITH, Government Plant Pathologist and
OLGA M. GOSS, Plant Pathologist

BACTERIAL canker is perhaps the most serious disease confronting tomato growers in Western Australia. Once established in a planting, it is very difficult to control and it can also persist in the soil or on the supporting stakes from season to season. The disease was first recorded in Western Australia in December, 1945, when it was introduced in seed of the Tatura variety ex the Eastern States. Since then it has become very widespread.

Most commercial growers in this State, stake and prune their tomatoes, and use overhead irrigation—conditions which all favour the rapid spread of the disease. Bacterial canker not only affects the market quality of the fruit but by causing premature death of plants it also seriously reduces the yield.

Pruning is one of the major means of spread of this disease, and in this article reference is made to a possible means of reducing spread by this means.

SYMPTOMS AND EFFECTS

Typically, the disease spreads from the base of the plant upward causing the lower leaves to die progressively up the stem. Death of the leaves is preceded by a gradual marginal withering and upward rolling of the leaflets (Fig. 1) frequently confined at first to single leaflets, or the leaflets on one side of the leaves only which shrivel up before the remainder (Figs. 1 and 2). Eventually the whole leaf shrivels and dies, and hangs down, but it does not fall readily from the plant, for the leaf stalk remains erect and stiff and

Fig. 1.—Single leaf showing early stages of disease. Note uprolling of leaflets and slight marginal withering. Note also that a single leaflet has shrivelled before the remainder

Fig. 2.—Single leaf (still attached to plant) at later stage of the disease. Note shrivelled leaflets on one side of leaf only, and marginal withering and uprolling of remainder

only gradually withers (Fig. 3). If such infected leaves are broken from the stem, a discolouration of the water-conducting tissue is visible, yellow at an early stage and brown at a more advanced stage of the disease.

When cut in section the stem shows definite browning of the water-conducting tissues extending into the pith which also becomes yellowed and finally dark brown. There is a tendency to mealiness and to the formation of pockets in the pith which finally becomes hollowed out. Browning and breakdowns of the pith is more definite at the nodes, and there is little evidence of the disease in the below-ground parts of the plant (Fig. 4, a, b, and c.)

During wet weather or when overhead sprinklers are used, whitish, round to oval, spots often appear on stems (Fig. 5A), leaf stalks, and sometimes on the leaves also. When the fruit develops it may also show this external spotting, white at first, then with a brownish and usually cracked centre (so-called bird's eye spotting) (Fig. 6). This symptom, when it occurs, is absolutely diagnostic of the disease.

In the later stages of disease development, the stems show elongated, whitish patches which may split longitudinally, giving cankers, although under our conditions canker formation appears to be rare (Fig. 7). Sometimes the small white spots on the stem (Fig. 5A) may split and develop into secondary cankers.

The fruit often drops prematurely and may show a browning beneath the calyx lobes. In badly-affected fruits the browning extends internally resulting in brownish discoloured areas and brown water-conducting strands (Fig. 5B.)

Fig. 3.—Young plant inoculated by means of needle prick with *C. michiganense* (three weeks after inoculation). Note withered leaves which hang down from the erect leaf stalks

Superficially bacterial canker resembles fusarium wilt but the one-sided withering of the leaves, the absence of leaf yellowing, the formation of pockets in the pith, and the fruit spots and stem cankers when present, serve to distinguish it from the latter trouble.

DEVELOPMENT OF THE DISEASE

The disease is caused by a bacterial parasite *Corynebacterium michiganense* and these minute organisms are generally introduced into new areas by means of infected seed or seedlings.

The bacteria invade the fruit of diseased plants through the water-conducting strands, with the result that the seeds become infected. Fruit invaded at an early stage may show internal discolouration (Fig. 5B) but it should be noted that fruit invaded at a later stage of development may ripen normally, and show little or no internal evidence of the disease to the naked eye.

However, the seeds saved from such fruit may give rise to the disease when planted.

When infected plants are present in either seed-bed or field, the disease may be spread in any of the following ways:—

(a) Handling of seedlings during transplanting, if a diseased seedling is handled prior to healthy ones.

(b) Pruning. This has been shown to be a very important means of spread. When laterals are pinched out by hand, sap containing the bacteria exudes, and this is transmitted by the fingers to the next plants which are handled. Even when only a few plants in the crop are initially infected, the disease is very rapidly transmitted to the remainder by this means unless precautions are taken. Most growers have noticed that within a fortnight or so of the first pruning, the disease has become very obvious throughout the crop even when previously they had been unaware of its presence. As a result of this, experiments have been conducted recently to study

Fig. 4. — Longitudinal sections of stems
(a) Early stage, showing browned water-conducting strands in stem and leaf stalk
(b) Later stage showing in addition slight discolouration of pith
(c) Final stage with pith very dark and tending to break down with form cavilities.
N.B.—Widening of discolouration of nodes

means of reducing the spread by pruning. It has been found that hand pruning (as commonly practised by growers in this State) favours the spread of the disease as compared with knife pruning.

A further reduction can be obtained by sterilising the knife with Cetrimide disinfectant after pruning each plant (see control.)

(c) In the splash from sprinklers, rain, etc., especially if wounds are present on the plant. (This also

Fig. 5.—Portion of stem and attached fruit showing external whitish spots caused by splashing with water containing the canker organism

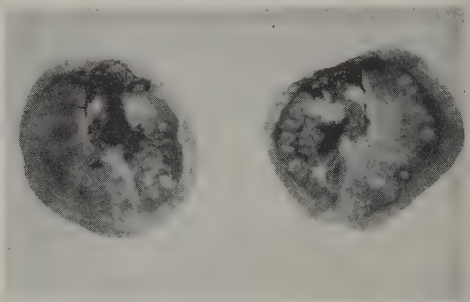

Fig. 6.—Longitudinal section of tomato fruit showing browning below calyx lobes, brown discoloured areas in pith and browned water-conducting strands due to presence of the disease

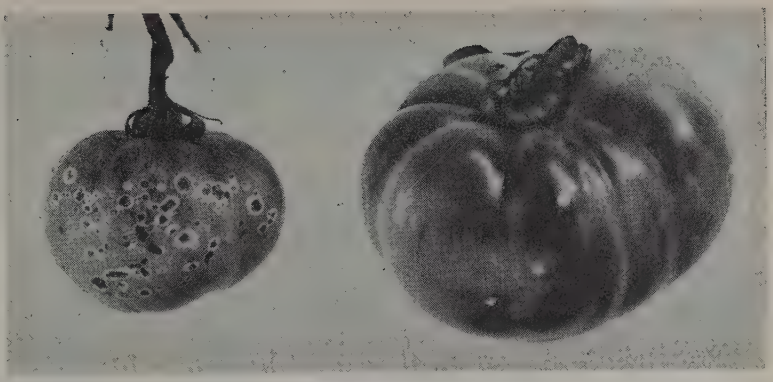

Fig. 7.—Fruit showing "bird's eye" spotting due to external infections with the canker organism. On left: badly infected fruit. Note white haloes and dark centres of spots. On right: early stage of spot

gives rise to the surface fruit spots which make fruit unsightly and lower its market value.)

(d) Observations also suggest that the disease can be transmitted by insects following feeding on infected plants.

CONTROL

1. Growers who intend to save their own seed should select disease-free plants for this purpose, as infected seed is an important source of primary spread.

2. Seed should be extracted by fermenting the pulped fruit without water for four days in a cool shady place. The fermenting material should be stirred night and morning to submerge pulp floating on the surface. This is not only an easy method of seed extraction but also some of the disease bacteria are killed during the fermentation period.

3. Finally, prior to planting, all seed, irrespective of its source, should be disinfected by steeping for 25 minutes in hot water plus formalin maintained at a temperature of 127° F. (Use one fluid ounce or two tablespoons of formalin to 2½ gallons of water). After treatment, dry the seed as quickly as possible and when completely dry dust with an organic mercury dust (e.g. Cresan, Agrosan). This hot water treatment plus dusting also helps to control other seed borne diseases such as fusarium wilt, bacterial wilt, early blight and damping-off.

4. Plants which show definite symptoms of the disease at an early stage either in the seed bed or the field, should be removed and destroyed as soon as possible. If allowed to remain, they will serve as

Fig. 8. — Stem of diseased plant showing elongated, light, sunken patches, which may split to form cankers, as in specimen. Canker formation appears to be rare under our conditions

primary infection centres from which the disease may spread in various ways to the remaining healthy plants. After removing such plants, the hands should be thoroughly washed in soapy water before healthy plants are handled.

5. For the reasons set out in the section concerning spread of the disease by pruning, growers are strongly advised to test out the following method on at least part of their crop. When pruning, use a sharp knife to remove laterals instead of pinching them out with the fingers and, after pruning each plant, disinfect the knife with a 1 per cent. solution of cetrimide (sold commercially as Cetavlon). This can be carried out quite easily by tying a plastic sponge soaked in cetrimide solution to the belt. A tin containing a gallon or so of the bulk solution can be placed at the end of the rows so that the sponge can be moistened as required. Growers who have tested this method report that once they have become accustomed to the use of a knife it is almost as quick as hand pruning.

6. After harvest, diseased crop residues should be burnt rather than ploughed in, and the ground should not be planted again to tomatoes for at least three years.

7. Seed bed sites should be changed at each planting, and if permanent wooden frames or seed boxes are used these should be disinfected by drenching with 2 per cent formalin (1 gallon commercial formalin in 49 gallons of water) or 2 per cent. bluestone solution (1 lb. in 5 gallons of water). Old stakes should also be dipped in one of these solutions.

8. Keep insect pests under control by regularly spraying with insecticides.

(Full details of a simple home made apparatus required for carrying out the hot water seed treatment are given in Advisory leaflet No. 1044 obtainable free of charge from the Department of Agriculture).

REFERENCE

W. P. Cass Smith and O. M. Goss—Bacterial Canker of Tomatoes, W.A. Jnl. Agr., Vol. XXIII 2nd Series (1946), pp. 147-156.

COVER SPRAYING FOR THE CONTROL OF CELERY LEAF SPOT

By S. C. CHAMBERS, M.Sc., Plant Pathologist

INVESTIGATIONS commenced during the past autumn have indicated that Bordeaux 4:4:40 is the most effective of eight fungicidal preparations tested as cover sprays for the control of celery leaf spot.

Leaf spot or late blight of celery is incited by the fungus *Septoria apii* Chester and was first recorded in Western Australia at Osborne Park in 1923. Since then it has become a limiting factor in the production of marketable celery grown during the winter months. Frequently, the disease originates in seed beds and slightly affected transplants often serve as foci from which the disease spreads epidemically throughout crops.

SYMPTOMS

Usually the disease first becomes evident on the older lower leaves of a plant and gradually spreads upwards and inwards to the younger foliage. On leaves it causes somewhat circular spots which seldom exceed $\frac{1}{8}$ in. diameter (see illustration). These are yellow to brown at first, but later become stippled in appearance and finally almost black, as large numbers of minute black fungal bodies (*pycnidia*) are formed in them. Coalescence frequently occurs when spots are very numerous, culminating in the partial or complete collapse of leaflets and leaves. Spots on stems tend to be elongated rather than circular.

EXPERIMENTAL

Although preventive spraying with a copper-containing fungicide has been suggested to growers in the past, no experimental work has been carried out

previously in this State. Recently, favourable results were obtained with some of the newer fungicides in New Zealand by Jacks (1955) and Jacks & Webb (1956). As a result, it was decided to evaluate some of the more promising of these materials under Western Australian conditions and to compare them with a standard copper-containing fungicide.

Leaf spots caused by the fungus *Septoria apii*

Method:—The trial was conducted on a property at Balcatta using portion of a crop transplanted on March 28, 1958.

The experimental design was a simple randomised block containing four replications of nine treatments and the component plots measured 25 links in length by 2 rows in width.

The fungicides tested as cover sprays were:—Bordeaux 4:4:40; Captan 2 lb.-100 gal.; Phygon 1 lb.-100 gal.; Thiram 1½ lb.-100 gal.; Vancide 2 lb.-100 gal.; Ziram 1½ lb.-100 gal. and Zineb 1½ lb.-100 gal.

Calcium caseinate (1 lb.-100 gal.) was used as a spreader for the Bordeaux mixture and Triton B 1956 (3-4 fl. oz.-100 gal.) was added to each of the remaining fungicides. Spraying was commenced on April 10, 1958, and continued at 10-14 day intervals until July 19, 1958.

An assessment of leaf spot incidence in relation to treatment was made on July 24, 1952. In order to do this, randomised samples of 100 leaves from each plot were examined and a numerical value was allotted to the condition of each leaf in accordance with Table I.

Table I.

CLASSIFICATION OF LEAF SPOT SYMPTOMS ON INDIVIDUAL LEAVES.

Class	Symptoms on Leaf	Numerical Evaluation
1	No visible symptoms	0
2	Less than four lesions per leaflet	1
3	More than four lesions per leaflet	2
4	Partial or complete collapse of one leaflet	3
5	Partial or complete collapse of more than one leaflet	4

The mean leaf value obtained for each plot was transformed to an $\sqrt{x}$ value during the analysis of results.

Results:—The final analysis of leaf spot incidence in relation to treatment is contained in Table II.

Table II.

EFFECT OF VARIOUS COVER SPRAYS ON INCIDENCE OF S. APII.

Fungicide	Evaluation of Leaf Spot Incidence	
	Mean Leaf Value	$\sqrt{x}$
Bordeaux	0·07	0·23
Phygon	0·10	0·29
Ziram	0·16	0·39
Zineb	0·27	0·51
Captan	0·30	0·55
Thiram	0·34	0·58
Vancide	0·63	0·79
Ferbam	0·74	0·85
Control (no fungicide)	2·51	1·58
Difference for Significance—		
5% level		0·16
1% level		0·22

During the trial, it was noted that plants sprayed with Phygon were retarded in growth and a paler green than normal.

DISCUSSION

The significant reduction in Septoria leaf spot following the regular application of fungicide emphasises the necessity for

routine spraying of winter grown celery. Of the eight materials examined in this trial Bordeaux mixture was significantly better than all others with the exception of Phygon. However the apparent retardation of growth by Phygon casts some doubt upon its commercial usage for celery.

On the other hand Bordeaux has the disadvantage of discolouring the foliage and this may detract from the market value of the produce. Because of this, further work is proposed using split schedules in which Bordeaux is followed by other fungicides before making a general recommendation to growers.

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ACKNOWLEDGMENTS

The author is indebted to Mr. R. Schultz, Balcatta, on whose property the trial was conducted. Acknowledgment is also made to Mr. W. Pickering for his assistance with the field work.

A NOTE ON THE OCCURRENCE OF STUNT DISEASE IN SUBTERRANEAN CLOVER

By H. L. HARVEY, B.Sc. (Agric.), Senior Plant Pathologist

THE stunt virus disease of subterranean clover, formerly referred to as "little leaf," was found during the winter of 1958 in the South Coastal agricultural areas at Esperance, Gibson and Gairdner River on subterranean clover varieties Bacchus Marsh, Dwalganup and Yarloop. Reports indicate that it also occurred in 1955 at Esperance.

In most of the affected paddocks, one or two per cent. of plants were diseased. In some, however, the incidence was higher than this and in one case about 90 per cent. of the plants were affected.

The first recorded occurrence of this disease was in N.S.W. (Grylls and Butler, 1956). It was subsequently reported from Tasmania (Wade, 1957) and Victoria (O'Loughlin, 1958.)

SYMPTOMS

As the name suggests, infected subterranean clover plants may become severely

Fig. 1.—Subterranean clover seedling showing large older leaves and stunted young leaves which emerged after virus infection had occurred

Fig. 2.—Young leaf (enlarged) only partly unfolded, showing typical malformation and marginal yellowing associated with the stunt disease

stunted. Leaves which have developed prior to infection grow to a normal size, but often turn red later. Those which emerge after infection are extremely small, distorted in shape and pale coloured (Fig. 1). They are very slow to open out and for a long time leaflets remain folded upwards along the midrib with undulating pale green to yellow margins (Fig. 2). This marginal yellowing usually persists after the leaflets unfold, by which time they are noticeably puckered. Leaf stalks are shorter than in normal plants. These abnormalities of shape, size and colour contrast strongly with the large, dark green flat leaves of healthy subterranean clover plants (Fig. 3.)

As the percentage of affected plants increases, so the total bulk of clover pasture will be reduced. There is preliminary evidence, also, that seed setting is impaired but the full significance of this aspect of the disease has not yet been assessed.

CAUSE AND TRANSMISSION

The disease is caused by a virus shown by Grylls and Butler (1956) to be transmitted by two species of aphides (*Aphis craccivora* and *Myzus persicae*). A colony of black aphides which was found on the diseased subterranean clover from Esperance and which has been tentatively identified as *A. craccivora,* readily transmitted the disease when transferred to healthy Bacchus Marsh test plants. Aphid transmission is the only known natural means of spread of the stunt virus.

CONTROL

No recommendations can yet be made for the control of subterranean clover stunt. However, the disease-resistance found by O'Loughlin (1958), in Tallarook and some European varieties of subterranean clover may be useful for breeding other suitable stunt-resistant varieties.

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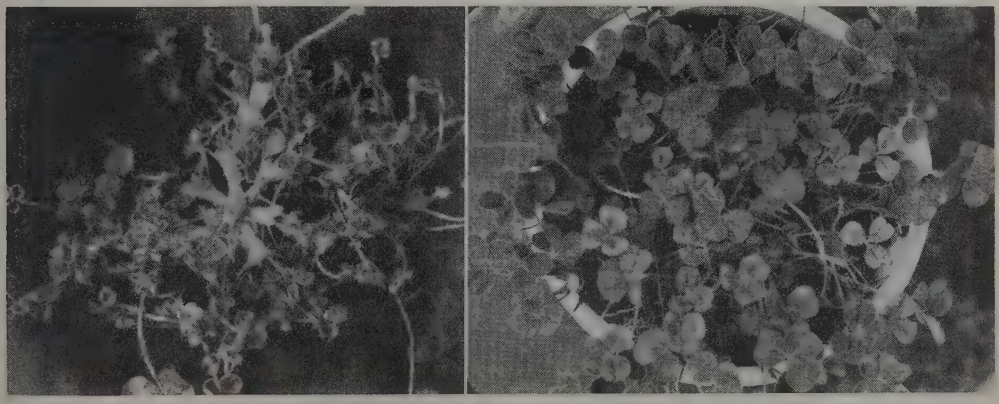

Fig. 3.—Left:—Small malformed, discoloured leaves on stunt-infected subterranean clover. Right—Normal foliage on healthy subterranean clover

ROOT-KNOT EELWORM OF POTATOES

By OLGA M. GOSS, B.Sc. (Hons.), Plant Pathologist

IN market gardens, the widespread occurrence and economic importance of root-knot eelworm has long been recognised, but in potato-growing areas the presence of the pest is sometimes overlooked. This is because tuber quality rather than total yield is affected. With a light infection, symptoms on the tubers may escape notice even when the crop is dug. However, the planting of infested tubers may lead to the contamination of new areas, and therefore the disease should be avoided particularly in crops grown for seed.

SYMPTOMS

Above Ground.

Unlike other crops, such as root vegetables and tomatoes, which frequently show severe stunting and unthriftiness when attacked by eelworm, the potato usually develops no abnormal above ground symptoms, and it is not till the tubers are harvested that the eelworm damage can be detected.

Tubers.

External symptoms are visible either as lumps or swellings on the surface (Fig. 1) or as roughened slightly raised areas closely resembling common scab in appearance (Fig. 2). However, when the surface skin is shaved off, differences are obvious, for areas of clear translucent tissue in sharp contrast to the opaque white tissue of the normal potato are evident (see Fig. 3). These cleared areas may extend up to ½ in. into the potato. Frequently the female worms can be seen with the naked eye deeply embedded in them (see Figs. 4 and 5). Unlike most plant parasitic eelworms, which are worm-like and invisible to the naked eye, the mature female root-knot eelworm assumes an almost spherical form about 1/32 in. in diameter. They are pearly white in colour and can be easily dug out of the potato with a needle or pointed knife. These females lay their eggs in sac-like structures which becomes brown in colour as they mature and so gives the cut potato a fly-specked appearance. At maturity the egg sacs are larger than the females and partially surround them.

Fig. 1.—(Left) Potato tuber infected with root-knot eelworm showing swellings or lumps caused by the disease. (Right) Healthy tuber for comparison

Fig. 2.—(Left) Potato tuber infected with root-knot eelworm showing the scab like lesions frequently found associated with the disease. (Right) Healthy tuber for comparison

LIFE HISTORY OF ROOT-KNOT EELWORMS ON POTATOES

The worm-like larvae which have hatched from eggs in the soil enter the roots or young tubers of the potato plant. They now become sedentary and, in the tuber, feed on the stored starch giving rise to the cleared areas mentioned above.

In the course of a few weeks, mature, rounded egg-laying females develop. Sometimes the larvae emerge from the eggs whilst still in the potato, giving rise to a massed infection, whilst at other times the egg sac is freed into the soil by rupture of the epidermis and breakdown of the external potato tissues. Such freed eggs can produce new infection sites on other tubers or remain in the soil ready to infect subsequent crops.

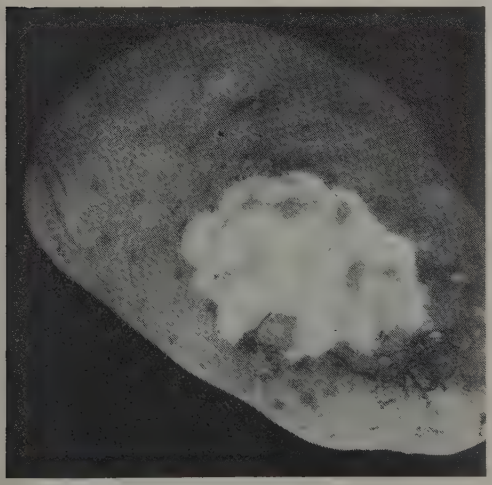

Fig. 3.—Skin partially shaved off a diseased tuber to show the cleared translucent areas (appear grey in photograph) below the scabs. These are in sharp contrast to the opaque white tissue of the potato. Other diseases such as common scab do not show this clearing of the potato tissues

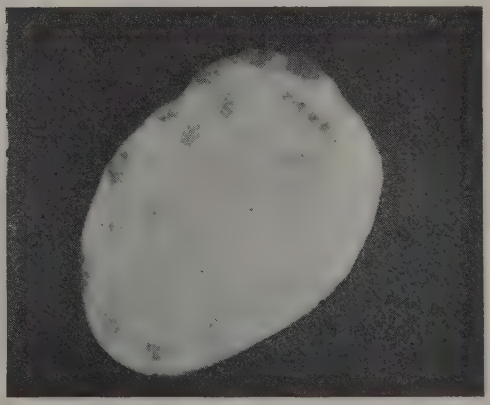

Fig. 4.—Cross section through an infected potato. Note the cleared areas extending below the skin (again appearing grey) and the female worms deeply embedded in the tissue

CONDITIONS FAVOURABLE TO DEVELOPMENT

Growth and reproduction is more rapid in warm weather than in cold and therefore the damaging effects of eelworms are greatest during the summer months. There are indications that excessive moisture favours the galling of the tubers.

MEANS OF TRANSMISSION

The root-knot eelworm may be introduced to new areas in a number of ways, including—

(1) Soil on implements—e.g., cultivators, etc.
(2) Drainage from infested areas.
(3) Planting of infected seed potatoes.
(4) Planting of infected seedlings, e.g., tomatoes, tobacco, etc.

Planting of infected seed potatoes is probably the most important. If the seed is heavily infected, diseased tubers are readily detected but light infections can easily escape notice unless very careful sorting is carried out.

Standard fungicidal dips do not control eelworm as the females are so deep-seated in the tubers.

CONTROL

Carefully cull out all seed pieces showing suspicious symptoms, to avoid introducing the disease to clean areas.

Clean all soil from implements when going from infested to clean areas.

If it is essential to grow potatoes on badly-infested soil, fumigation before planting with DD or E.D.B. should be considered (see Leaflet 2451).

Avoid including tomatoes or tobacco in the crop rotation programme as these plants are susceptible to many of the same diseases as potatoes (including root-knot eelworm).

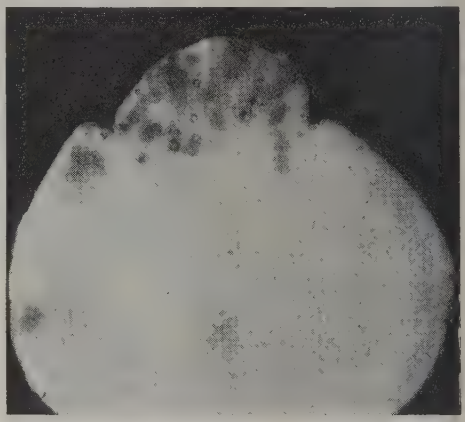

Fig. 5.—Enlargement of a section through the end of a galled potato. Note the clearing of tissue and the embedded females some of which are surrounded by egg sacs

FREE SERVICE TO FARMERS

Do you know that the Department of Agriculture provides a comprehensive service of advice and technical assistance to farmers, free of charge?

When in need of advice, get in touch with your District Officer whose name and headquarters township will be found in the list of Departmental personnel on Pages 590 and 591.

These officers are there to help you and will make personal visits to your property to assist with on-the-spot advice. In addition, they will, where necessary, arrange for the services of specialist officers—all without cost to you.

Fig. 1.—This contour working requires no contour banks. If fences are well placed there is no inconvenience in working on the contour. Rain which has just fallen is soaking into the soil right where it falls. Water cannot concentrate in amounts large enough to cause erosion or bogginess.

FARM PLANNING

5.—Soil Erosion Control

By B. a'B. MARSH, B.Sc. (Agric.), Adviser, Soil Conservation Service

IN the previous four articles on the subject of farm planning there has not been very much discussion of soil erosion control. Earlier articles have put forward the fundamental ideas that fences should follow natural boundaries and be related to topography. This method of fencing helps in the prevention of erosion because attention is paid to over-stocking, gateway erosion, cultivation, tracks and firebreaks. As well as the prevention of erosion the cure of erosion should also be considered.

There are several methods of controlling erosion and their use depends on the type or degree of erosion.

The growing of pastures is the simplest method of erosion control. Pastures reduce runoff by increasing the absorption of water. The plant material also reduces the speed of runoff and so lengthens the time water takes to reach water channels. This causes a reduced volume of flow and erosion control is made easier. Pastures can be improved only under conditions where grazing can be controlled, and grazing control is much easier in planned layouts which take into account water supplies and the different soil types.

Contour working and contour banks are the principal contour practices. Contour working is simplest; it involves working between guide lines which are level across the slope and nearly parallel. In unplanned fence layouts, awkward sections do occur, but in a redesigned fence layout the same areas can usually be contour worked quite easily. Contour working is often thought to be difficult by farmers with no experience of the method (see Fig. 1.)

The methods of subdivision mentioned in the last article on farm planning are based on fencing at right angles to the contour, along ridges and on the contour. This method of fencing automatically fits in well with contour working. Fencing along natural boundaries keeps fences out of the way of cultivation. While this may not constructively help to work on the

Fig. 2.—Soil erosion control by contour banks was made very difficult by the fences which have been marked in this photograph. These fences have no logical reason for their position and there are ample alternatives which would improve the layout.

contour it does at least cause less hindrance to cultivation.

Contour banks are used on land which has eroded, or is very likely to erode with normal farming. Their use is based on the principle that gullies cannot be safely filled or cultivated across unless water is diverted to a safe waterway. They enable cultivation on the contour right across a slope where normal cultivation can cause, or has caused erosion. Contour banks are ridges of soil about 18 in. high and extend with a slight fall right across erodible land. A bank may extend, say, from a rocky ridge on one side, to a grass covered waterway on the other side.

Access into each land can be most safely made around the high end and not around the waterway end of the bank. If fences cross a system of banks, access becomes a difficult problem (see Fig. 2), and for this reason, fences should not cross areas definitely in need of contour banks.

Fencing on natural boundaries, such as rocky ridges helps by keeping fences in areas where banks cannot be built. Fences on natural boundaries such as creeks and hollows, usually result in waterways being on the boundary of natural paddocks, so that these waterways are common to two paddocks. Banks can be discharged at these waterways and do not have to be taken through fences.

If large areas requiring contour banks have to be subdivided across the slope, it is most convenient to place the subdividing fence halfway between two banks and in straight stretches of about 5 or 10 chains, approximately following the contour (see Fig. 3.)

Waterways to guide excess water from the property should be grass-covered. Waterways are considered as natural boundaries when planning and if fences follow such waterways there will not be any reason to cultivate across them.

Fig. 3.—This contour fence is on a contour bank. There are minor disadvantages associated with erection and maintenance of the fence and the bank. Subdivision across the slope is probably best carried out with the fence half way between two widely spaced banks and built in straight sections of 5 or 10 chains so that it can be approximately parallel to the banks.

Fig. 4.—Though this trouble was caused by sheep travelling to badly-distributed watering points, removal and re-siting of fences is necessary to allow filling, protection and stabilisation.

Fig. 5.—This main entrance track erosion can be cured and prevented simply by grading the area to make a formed road with mitre drains diverting water to the side at frequent intervals. As the fence is directly downhill and at right angles to the contour, contour working is not awkward.

If waterways are gullied, their eventual filling and healing should be kept in mind. A new fence plan could result in a gullied watercourse being no longer inconvenient and it might seem unnecessary to heal such a gully. However, in the future such waterways may be required to receive discharge from contour bank systems which are not obviously wanted at the moment. This situation could arise in the future if cultivation is carried out more intensively that at present.

In the next decade or two, the population of Western Australia and the world will be such that increased production will be essential. Increased production will almost certainly bring about intensified cultivation and this will require increased use of contour banks and their use in turn requires stable waterways. Though this situation may not arise for some time, it can take a long time to stabilise the drainage system on a farm, and it would also take a long time to re-fence to allow easy stabilisation of the drainage system (see Fig. 4). The sooner a start is made the sooner the farm can be made ready for any advances in agriculture.

To sum up, erosion control is necessary to maintain productivity now and to cope with increasing production in the future. Fence planning can not only help to prevent erosion from occurring but it can help in the cure of existing erosion.

6.—Replan Your Fences

IN this Journal, previous articles on farm planning for soil conservation have discussed the necessity for planning from the point of view of topography, farm management, subdivision and erosion control. Most men on the land would agree, after reading these articles, that not only would a different fence layout be advantageous, but that in order to adopt it and all it involves, the farmer must work to a plan.

A large number of men in agreement with the basic ideas would have to shelve any thought of major planning on their properties because their fences are too good to consider their replacement in the next ten or fifteen years. Other farmers, however, who have fences in need of replacement must do something in the near

Fig. 1.—This boundary fence has indirectly caused erosion and yet it cannot be moved. Plans can be made to fill the eroded firebreaks and to protect the area with contour banks. Water from the firebreaks can then be discharged into the ends of contour banks simply by turning circles with the plough, just uphill from the ends of the banks

future even if finances are difficult and these are the men who can derive most benefit from using some of the ideas put to them in these articles.

Another section of the farming community includes those with new properties now being developed. Basically the same ideas apply but they are more difficult to put into practice, because the owner knows practically nothing about the water supply position and also because there are no accurate maps of the property on which the natural features can be mapped accurately and above all, quickly.

There are many farmers now wanting soil conservation farm plans and there are certain to be more in the future. It is unlikely that the Soil Conservation Service will be able to draw up farm plans for all who ask and it is hoped this article will enable many to draw up satisfactory plans for themselves.

The following procedure for compiling a plan applies to farms with many fences in need of replacement; with gently undulating to steep land; or with widely differing land use types such as sandy country likely to blow, salt land, sloping country likely to wash, and other heavy land. The procedure is applicable to country which is used for grazing stock plus cultivation for cereals. It applies to practically every farm in the sheep and cereal areas.

PROCEDURE

A map is necessary and this should have marked on it with reasonable accuracy, all the existing fences.

A special trip must be made around the farm so that all relevant details can be marked onto the map. The mapped fences can be used for reference points to help map accurately the following:—water supplies, rocky ridges, permanent clumps or strips of trees, shade belts, etc., all salt or seepage areas, wind blown areas and erodible sandplain of 30 acres or more. All-weather tracks should also be marked if much difficulty is experienced on the farm in this respect. If all-weather tracks can be established fairly easily by grading and forming or by a small amount of gravel carting, tracks should not be marked in at this stage. Particular attention should be paid to the drainage pattern even up to the high country. All drainage lines should be mapped even if they only drain 50 acres at the head. Eroded or grassed depressions which can run small quantities of water in normal rains should be included.

While travelling around the farm, try to imagine that you are a newcomer seeing the erosion gullies and eroded tracks, firebreaks and farmyards for the first time. Find out how to cure all this erosion. Single gullies can be filled safely only if short spreader banks are built. Gully

Fig. 2.—This was a farm track. Being directly uphill it would have been quite safe and permanent if it had been formed and water dispersal made safe by use of spur or mitre drains. Plans should allow for permanent formed roads for ready access to all sections of the farm

systems need contour banks to divert water to safe waterways. Eroded farmyards can be stabilised by a circuit of formed roads. Isolated shallow washes caused by heavy rain on cultivated paddocks and shallow washouts along corner headlands can probably be cured simply by working on the contour. Most uneroded sloping land should be worked on the contour without contour banks.

The map will now show all the features and fences which make cultivation difficult. Transfer, by tracing or carbon paper, all the mapped details except those fences needing renewal within 15 years. This second map will appear to be less cluttered now that the fences have gone and the clear areas between lines are called natural paddocks.

At this stage, the other articles in this series should be studied so that a clear idea of the principles will be fresh in mind.

A general look at the map will show many natural paddocks, some small, some in need of subdivision and others ideal in size: these should be left as clear as possible of fences. Concentrate on one corner of the property and try to determine an ideal paddock layout keeping in mind the size of paddock you require, and all the other factors, but mainly water supplies. If a section seems too difficult, leave it for a while and concentrate on another section. Don't be put off by crooked fences as these will be less trouble in the long run than fences cutting across clear or open country. If an area has no definite problems and no obvious best subdivision, leave the fences where they are. Refer frequently to the other Farm Planning articles particularly Number 4 on Subdivision.

After an hour of fairly heavy concentration a pattern will emerge and finishing off will be much easier as with a jig-saw puzzle.

Where it is impossible to arrange for existing water supplies to water all paddocks reasonably cheaply and easily, think seriously about the possibility of sinking an earth tank near the most needy paddock regardless of catchment, and then use contour banks or a roaded catchment to fill it.

When the paddock layout is nearly complete, the whole plan should be studied to make sure that there is easy access into all paddocks and that movement of sheep will not be prevented anywhere by a particular paddock being in crop. Plan eventually to have graded roads on the main access routes to all paddocks. Such roads will increase efficiency, assist erosion prevention and will also serve as firebreaks.

The completed plan, which should be copied onto durable paper and kept safely,

Fig. 2.—Cultivation below a road culvert caused this gully. Plans should be made to make it impossible to cultivate such watercourses before they form gullies. This can be done by fencing along them or planting a few trees to mark the area not to be cultivated

might be so different from the original and made up of so many crooked fences, that it might run the risk of being discarded right away. The improved water supply plan, however, might look promising enough to make it worth a try. If misgivings are set aside and the plan used as a working plan, the advantages will make themselves felt as time passes.

NEW LAND

The procedure just outlined obviously requires detailed knowledge of the property; new land needs a different approach.

An approximate plan can be made to include the main waterways or creeks in the property, any extensive rocky ridges and and also boundaries of light and heavy land and perhaps areas likely to go salty. To go into more detail will take too much time. This plan of the main features will show several, probably large, areas which are clear on the map and bounded by these natural features. Clearing should be carried out within these large natural blocks and they should be fenced close to the natural features marked. As these natural blocks are developed, the farmer can become familiar with the property and by the time it is cleared and under pasture the more detailed planning can be commenced. It is very unlikely that the original fences will be unsatisfactory as they will be usefully placed.

SUMMARY OF SERIES

The six articles on farm planning which have appeared since the January-February (1958) issue of the Journal of Agricutlure of Western Australia have dealt with; 1. The need for Planning; 2. Grazing and Fences; 3. Natural Cultivation Boundaries; 4. Subdivision; 5. Soil Erosion Control and this 6th article on the method of plan-making.

Farm planning is a broad field and takes in stock planning, crop planning, pasture planning, machinery planning, economics and in fact every one of the many fields in which every farmer must be an expert. This series might appear to deal with nothing more than fence planning, but this is only because many different aspects of soil conservation and erosion control are affected in so many ways by the arrangement and relative permanence of fences. Management methods, for instance, can be altered from time to time to fit in with soil conservation requirements but fences cannot easily be changed from time to time and much thought must go into their planning.

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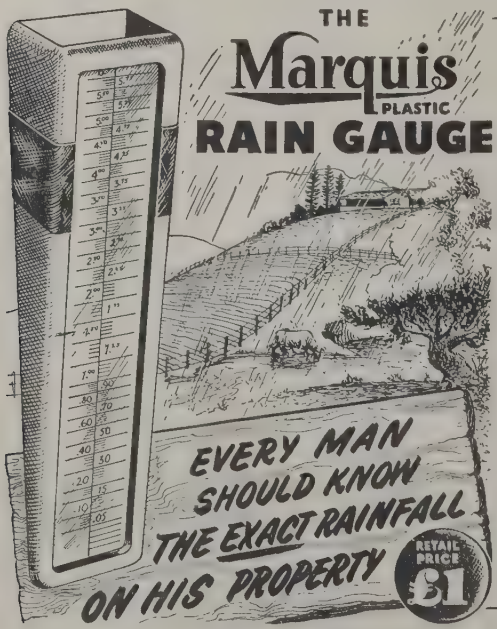

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A Guide to

THE HARVESTING OF PLUMS FOR EXPORT

PART – 2

By F. MELVILLE, Senior Adviser (Fruit) and J. S. BLOOMFIELD, Senior Packing Instructor

THE Santa Rosa is an important export plum variety. It is the earliest of the main varieties shipped to Singapore and under proper conditions of harvesting and handling it carries well. It is, however, necessary to give close attention to harvest maturity to ensure that the fruit will arrive in the best possible condition.

To assist growers to judge the correct picking maturity, the accompanying colour plate has been prepared showing the various stages through which the Santa Rosa passes during the ripening process. These changes which consist of a gradual yellowing of the green colour and an accompanying increase in red colour provide a definite means of assessing maturity, and can be used very effectively as a guide to harvesting. The first sign of maturity is the appearance of a dull red colour usually on the tip and suture of the plum as shown in Stage 2. As ripening continues the green ground colour develops a yellowish tinge while the red progressively diffuses through the skin until the whole fruit is tinged with red as in Stage 5. The colour then gradually deepens until when fully ripe the fruit is dark red as shown in Stage 8.

Santa Rosas in exposed positions on the tree, which will be the first harvested, develop more red colour than fruit in more sheltered situations so that for early pickings the plums will have a much higher colour than later in the season. In later pickings changes in the ground colour are more evident and must be taken into account in assessing maturity.

For early pickings, fruit should be selected between Stages 4 and 5, whereas later in the season the colour should tend towards Stages 3 and 4. Where plums up to Stage 5 of maturity are being packed care is necessary to ensure that the fruit is not overmature, that is the skin completely free from any deep red colouration, no evidence whatsoever of softening and no pink tinge in the flesh.

Santa Rosas increase in size considerably as the fruit matures and an increase of $\frac{1}{8}$ in. diameter can occur between successive pickings. This is a further advantage in delaying harvesting until the correct stage of maturity is reached.

Apart from harvesting at the right stage it is important to pick during the cooler part of the day, handle the fruit as soon as possible and cool store it promptly. Where long transportation before shipment is involved the fruit should be thoroughly cooled before despatch.

SANTA ROSA—Stages of Ripening

1.—Immature green; 2.—Initial blush; 3.—25% red; 4.—75% red; 5.—Tinge of red over most of surface; 6.—Light red; 7.—Bright red; 8.—Dark red

List of Departmental Publications . . .

THE bulletins named in the following list are mainly reprints of articles which have appeared in "The Journal of Agriculture" and the date of the original publication has been appended to facilitate reference to bound volumes of the Journal. Except where a price is expressly stated, these bulletins may be obtained free of charge either by applying at the counter of the Department of Agriculture or by writing to the Officer-in-Charge of Publications, Department of Agriculture, Perth. If ordering by letter please quote the serial numbers of the bulletins, not the titles. Not more than ten bulletins can be supplied in response to each application.

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2054 The Preparation of Rose Beds—May, 1953.
2118 The Budding of Roses—Jan., 1954.
2158 The Cultivation of Chrysanthemums—May, 1954.
2218 The Exquisite Camellia—Nov., 1954.
2251 Gerberas Have Many Fine Qualities—Mar., 1955.
2268 Floribunda Roses—You Can Make Your Garden Lovelier—May, 1955.
2294 Commercial Chrysanthemum Growing—Sept., 1955.
2304 Sturt Peas for Your Garden—Nov., 1955.
2339 Geraniums Return to Fashion—Mar., 1956.
2343 Winter Pruning of Roses—July, 1952.
2353 Dahlia Virus Diseases—May, 1956.
2420 Lawns—Their Establishment and Management—Nov., 1952.
2421 Daffodils for Everyone—Nov., 1952.
2449 Flowering Shrubs for all Seasons—May, 1957.
2467 Control of Weeds in Lawns—Sept., 1957.

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306 Black Spot or Scab of Apples—June, 1944.
542 Pawpaw or Papaya—Mar., 1938.
764 Preservation of Fruit—June, 1946.
863 Withertip of Apples—June, 1946.
935 Apple Scab Outbreaks, 1947-48—June, 1948.
951 Pre-Harvest Drop of Apples and Pears—Dec., 1948.
1068 Storage of Stone Fruit—Dec., 1951.
2000 Reduction of Pre-Harvest Drop of Washington Navel Oranges by 2,4-D Sprays—May, 1952.
2001 Cultivation of Cape Gooseberry—May, 1952.
2014 A Successful Method of Spraying Against Looper Caterpillars—Sept., 1952.
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2015 Thinning of Deciduous Fruit Trees—Sept., 1952.
2018 The Passion Fruit—Sept., 1952.
2021 Crown Gall of Fruit Trees and Other Plants—Nov., 1952.
2033 Scald in Granny Smith Apples—Jan., 1953.
2180 Preparation of Fruit for Marketing—Sept., 1954.
2206 The Effectiveness of 2,4-D in Preventing Drop in Washington Navel Oranges—Nov., 1954.
2235 Loss in Weight of Stored Jonathan Apples—Jan., 1955.
2260 Plant Quarantine—July, 1954.
2266 DNC Oil Sprays for Deciduous Fruits—May, 1955.
2267 Restrictions on the Movement of Fruit—May, 1955.
2289 Hormone Sprays and Their Effects on the Setting, Yield and Vigour of Currant Grape Vines—Sept., 1955.
2306 The Handling, Presentation and Storage of Stone Fruit—Nov., 1955.
2315 A Lug Box for Picking and Storing Fruit—Jan., 1956.
2316 Sod Culture—A System of Orchard Soil Management—Jan., 1956.
2382 Pollination of Ohanez Grapes—Sept., 1956.
2383 Post-War Trends in the Citrus Industry—Sept., 1956.
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2437 Pruning of Grape Vines—May, 1957.
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2456 Apple Mosaic—A Virus Disease—July, 1957.
2457 Bulk Handling in the Orchard—July, 1957.
2451 Root Knot or Eelworm Gall Diseases—
2462 A Spraying Guide for the Control of Pests and Diseases of Fruit—July, 1957.
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2485 Sensational Apple Yields—Sept., 1957.
2489 A Guide to Harvesting of Plums for Export—Nov., 1957.
2510 Bacterial Canker of Stone Fruits—Jan., 1958.

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2090 Goat-Keeping for Beginners—Sept., 1953.
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953 Yield and Flour Strength of Wheat—Mar., 1949.
1048 A Calendar of Farming Operations—July, 1952.
2020 Pedigree Seed of Wheat, Oats and Barley—Dec., 1952.
2142 The Basic Principles of Wheat Marketing (Price 2s.).
2174 Oats and Barley Varieties in Western Australia—July, 1954.
2185 New Cereal Varieties in Australia—Sept., 1954.
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2229 Maize Grain Trial—Jan., 1955.
2293 Oats and Barley for the Export Market—Sept., 1955.
2350 Cereal Variety Trials, 1955-56—May, 1956.
2370 The Flour Quality of Early-Maturing Wheat Varieties—July, 1956.
2391 Oats and Vetches for Hay and Silage—Nov., 1956.
2430 Kent Oats—Mar., 1957.
2473 Oat Trials and Usage in the Wheatbelt, 1956—Sept., 1957.
2476 Broom Millet—Sept., 1957.
2478 Oats and Vetches Show their Worth at Bridgetown—Sept., 1957.
2480 Cut or Graze Your Fodder Crops Early—Sept., 1957.
2509 Manganese Deficiency in the Cereal-Growing Areas—Jan., 1958.
2522 Oats and Vetches Demonstrations—Mar., 1958.
2524 Maize for Fodder or Grain—Mar., 1958.
2527 Barrel Medic for Wheatbelt Pastures—Mar., 1958.
2529 The Use of Copper and Zinc in the Cereal-Growing Districts of W.A.—Mar., 1958.
2533 Demonstrations Show the Value of Fodder Crops—Mar., 1958.

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1066 An Automatic Windmill Shut-Off—Dec., 1951.
1073 More Automatic Windmill Shut-Offs—Jan., 1952.
2136 Ropes, Knots and Splices—Mar., 1954.
2186 Farm Butchering—Slaughtering, Skinning and Dressing a Sheep—Sept., 1954.
2204 A Tank Indicator Gauge—Nov., 1954.
2208 A Handy Drum-Tipping Cradle—Nov., 1954.
2216 Preparing and Using Rawhide—Nov., 1954.

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2224 Some Points on Paints and Painting—Jan., 1955.
2273 A Stool-Ladder for the Orchard—July, 1955.
2412 A Farm-Made Water Heater—Jan., 1957.
2422 Farm Fencing Hints—Jan., 1957.
2463 How to Make and Use the 90 Degrees V-Notch—July, 1957.

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2361 Internal Parasites of the Horse—July, 1956.

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712 Cabbage Butterfly—Mar., 1943.
780 Bed Bugs—June, 1944.
792 Vegetable Weevil—Sept., 1954.
812 Pear Slug—Mar., 1945.
879 Experiments in D.D.T. and 666—
941 Argentine Ant—Jan., 1956.
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2027 The Citrus White Fly—Mar., 1953.
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2083 Insect Pests—Cutworms—July, 1953.
2094 Recent Investigations into Grasshopper Control in W.A.—Sept., 1953.
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2115 Vine Leaf Blister Mite—Jan., 1954.
2127 The Cabbage Moth—Mar., 1954.
2143 The Sheep Blowfly Problem—
2144 Lucerne Flea—Mar., 1956.
2145 Termites or White Ants—Mar., 1941.
2156 New Insecticides—Fruit Fly Control—May, 1954.
2188 Potato Moth—Sept., 1954.
2205 Fleas and Their Control—Nov., 1954.
2230 Climbing Cutworm—Jan., 1955.
2239 Red Spider—Mar., 1955.
2264 Lucerne Flea—May, 1955.
2274 Apple Blemishes and Their Control—May, 1955.
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2300 New Hosts Records for the Mediterranean Fruit Fly in W.A.—Nov., 1955.
2319 The Effectiveness of Dieldrin for the Control of the Argentine Ant in W.A.—Jan., 1956.
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2331 The Red-Legged Earth Mite and Lucerne Flea—Mar., 1956.
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2354 The Mediterranean Fruit Fly—May, 1956.
2369 Cockroaches and Their Control—Mar., 1956.
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2395 Codling Moth in W.A.—Nov., 1956.
2418 Formula Change in the Control of Lucerne Flea and Red-Legged Earth Mite—Jan., 1957.
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2439 An Exhaust Sprayer for Grasshopper Destruction—May, 1957.
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2454 Clothes Moths, Carpet Beetles and Their Control July, 1957.
2462 A Spraying Guide for the Control of Pests and Diseases of Fruit—July, 1957.
2469 San Jose Scale—Sept., 1957.
2490 Stored Grain Pests—Nov., 1957.
2544 Pasture Cockchafers—May, 1958.

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1073 Automatic Windmill Shut-Offs—Jan., 1952.
2125 Water for Agricultural Purposes—Mar. and July, 1954.
2177 Treating Hard Water—July, 1954.
2191 Permanent Structures for Irrigation Farms—Sept., 1954.
2204 A Tank Indicator Gauge—Nov., 1954.
2258 Farm Water Conservation—Clay Core Dams—May, 1955.
2259 Irrigation in Western Australia—Government Controlled Schemes, 1953-54—May, 1955.
2368 Irrigation in W.A.—Government Controlled Schemes, 1954-55—July, 1956.
2393 Roaded Catchments for Farm Water Supplies—Nov., 1956.
2397 Irrigation Projects on North-West Stations—Nov., 1956.

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2006 Shearing Time—July, 1952.
2139 Protection of Survey Marks—Mar., 1954.
2141 Protection of Birds and Animals—Mar., 1954.
2285 Agriculture Concerns You—Oct., 1955.
2290 Strychnine Poisoning in Dogs—Sept., 1955.
2292 Distemper in Dogs—Sept., 1955.
2321 Veterinary Science and the Veterinary Profession Jan., 1956.
2338 Management and Diseases of Cage Birds—Mar., 1956.
2390 Agriculture in Southern Africa—Nov., 1956.
2407 Stock Disease Control by Correspondence—Nov., 1956.
2419 List of Registered Stock Foods, 1956-57—Jan., 1957.
2425 Muresk Agricultural College—Mar., 1957.
2435 Hydatid Disease—Mar., 1957.
2466 Tractors Can Kill—July, 1957.
2496 Stone Roller as Mowing Aid—Nov., 1957.
2498 List of Registered Stock Foods, 1957-58—Nov., 1957.

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2087 Fodder Conservation in East Kimberley—Sept., 1953.
2147 Kimberley Project—
2148 Agricultural Extension in the North-West and Kimberley—May, 1954.
2178 Claypans in the North-West Spinifex Areas—July, 1954.
2187 Can a Blackfellow Do It?—Sept., 1954.
2194 Station Management—The Value of Deferred Grazing—Sept., 1954.
2198 The Wallaby Menace in the Kimberleys—Sept., 1954.
2302 Changes in Pastoral Vegetation can Provide a Guide to Management—Nov., 1955.
2303 Trapping Yards for Kangaroos—Nov., 1955.
2356 Pastoral Research—May, 1956.
2381 Pastoral Research in the Kimberleys—Sept., 1956.
2397 Irrigation Projects on North-West Stations—Nov., 1956.
2501 Pasture Regeneration in East Kimberleys—Jan., 1958.
2519 Producing Lucerne Hay for North-West Pastoral Areas—Mar., 1958.
2525 The Kimberley Wallaby Menace—Mar., 1958.
2536 Kimberley Research Station—Mar., 1958.
2540 Seed-Box for Sowing Buffel and Birdwood Grass Seed—May, 1958.

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855 Flax Rust—Mar., 1946.
872 Flax Seed Treatments—Sept., 1946.
936 Zinc Deficiency of Flax—June, 1948.
2476 Broom Millet—Sept., 1957.

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584 Sub-Clover—Influence of Method of Planting on Establishment—Dec., 1945.
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798 Cow Peas—Dec., 1944.
1031 First Early Subterranean Clover—June, 1939.
1082 Elephant Grass—Mar., 1952.
2020 The Regeneration and Maintenance of Wimmera Ryegrass Under Saline Soil Conditions—Nov., 1952.
2032 The Testing of Bacterial Strains Used in Legume Cultivation—Jan., 1953.
2185 New Cereal Varieties—Sept., 1954.
2202 Park-Land Clearing—Nov., 1954.
2219 Kapok Bush—Nov., 1954.
2231 Buffel Grass—Jan., 1955.
2240 Seed Quality—Mar., 1955.
2241 Two Promising New Cocksfoots—Mar., 1955.
2256 Tackling the Problems of the Spinifex Areas—May, 1955.
2261 Phalaris Tuberosa (Toowoomba Canary Grass)—May, 1955.
2281 Spring Sown Oats for Hay—July, 1955.
2282 Sorghums for Grain and Fodder in the South-West —July, 1955.
2302 Changes in Pastoral Vegetation Can Provide a Guide to Management—Nov., 1955.
2320 Oat Variety Trials (Autumn-Sown) Denmark Research Station—Jan., 1956.
2350 Cereal Variety Trials, 1955-56—May, 1956.
2351 Potassium for Subterranean Clover—May, 1956.
2356 Pastoral Research—May, 1956.
2365 Paspalum Grass—July, 1956.
2374 Lucerne Growing in Western Australia—Sept., 1956.
2380 Good Results with Red Clover at Denmark Research Station—Sept., 1956.
2381 Pastoral Research in the Kimberleys—Sept., 1956.
2387 Sudan Grass is Drought-Resistant—Sept., 1956.
2391 Oats and Vetches for Hay and Silage—Nov., 1956.
2403 Kikuyu Grass—Nov., 1956.
2414 Molybdenum for Subterranean Clover—Jan., 1957.
2424 Naturalised Clovers of Western Australia—Mar., 1957.
2430 Kent Oats—Mar., 1957.
2447 Subterranean Clover in W.A.—May, 1957.
2448 Tolerance of Sub-Clover (Trifolium Sub. L.) to Chlorinated Phenoxyacetic Derivatives—May, 1957.
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2473 Oat Trials and Usage in the Wheatbelt, 1956—Sept., 1957.
2478 Oats and Vetches Show Their Worth at Bridgetown—Sept., 1957.
2480 Cut or Graze Your Fodder Crops Early—Sept., 1957.
2484 Spring Oats for Hay—Sept., 1957.
2486 Fodder Conservation Brings Better Cream Cheques —Sept., 1957.
2491 Spinifex School—Pastoral Innovation—Nov., 1957.
2497 Preservatives and Nutritive Value of Silage—Nov., 1957.
2501 Pasture Regeneration in East Kimberleys—Jan., 1958.
2507 Light Land Development in the West Midlands—Jan., 1958.
2511 Kikuyu Grass—Planting by Machine—Jan., 1958.
2519 Producing Lucerne Hay for North-West Pastoral Areas—Mar., 1958.
2522 Oats and Vetches Demonstrations—Mar., 1958.
2524 Maize for Fodder or Grain—Mar., 1958.
2527 Barrel Medic for Wheatbelt Pastures—Mar., 1958.
2532 Manganese Deficiency of Subterranean Clover in W.A.—Mar., 1958.
2533 Demonstrations Show Value of Fodder Crops—Mar., 1958.

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2062 Infectious Pneumonia of Pigs—May, 1953.
2063 Swill Feeding—May, 1953.
2073 Swine Paratyphoid (Salmonellosis or Necrotic Enteritis)—June, 1950.
2140 Whale By-Products for Pig Feeding—Mar., 1954.
2181 Suppurative Otitis in Pigs—Jan., 1953.
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2326 Reduce that Pig Mortality—Feb., 1956.
2362 Coughing Pigs—July, 1956.
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306 Black Spot or Scab of Apples—June, 1944.
672 Grey Mould or Botrytis Rot of Apples—Sept., 1941.
677 Water Spot of Navel Oranges—Dec., 1941.
719 Bean Rust—July, 1954.
817 Bean Mosaic Menace—Mar., 1945.
818 Sclerotinia Twig Blight of Oranges—Mar., 1945.
886 Leaf Spot Diseases of Black Mulberry—Mar., 1947.
935 Apple Scab Outbreaks, 1947-1948—June, 1948.
946 Stem Rust of Wheat. Autumn Rainfall in Relation to Spring Epidemics—Sept., 1948.
979 Powdery Mildew or Oidium of Grapes—Sept., 1949.
1024 Bordeaux Mixture—Dec., 1935.
1063 Westralia. A New Rust-Resistant Pole Bean—Sept., 1951.
1089 Brown Rot of Citrus—Mar., 1952.
1090 Collar Rot or Brown Rot Gummosis of Citrus Trees —Mar., 1952.
2009 Hormone Weedicide Injury to Grapevines—July, 1952.
2009 Peach Leaf Curl—July, 1952.
2009 Shot Hole of Stone Fruit—July, 1952.
2009 Late or Irish Blight of Potatoes—July, 1952.
2011 The Control of Mealy Bug on Vines in W.A.—July, 1952.
2015 Lettuce Mosaic—Sept., 1952.
2027 Crown Gall—Jan., 1953.
2028 Black Spot or Early Blight of Tomatoes—Jan., 1953.
2056 Early Blight of Potatoes—May, 1953.
2057 Black Spot of Grapes—July, 1954.
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2105 Black Spot or Early Blight of Tomatoes—Nov., 1953.
2116 Early Blight of Potatoes—Jan., 1954.
2128 Cucumber Mosaic—Mar., 1954.
2155 Cereal Smut Diseases and Their Control—May, 1954.
2171 Black Spot (Anthracnose) of Grapes—July, 1954.
2214 Ascochyta—Blight of Peas—Nov., 1954.
2262 Plant Diseases—Downy Mildew of Onions—Mar., 1956.
2288 White Wax Scale—Sept., 1955.
2332 Recent Advances in Development and Use of Insecticides—Mar., 1956.
2352 Bean, Subterranean Clover and Lupin Diseases Caused by the Bean Yellow Mosaic in W.A.—May, 1956.
2444 Stony Pit of Pears—May, 1957.
2450 Chocolate Spot of Broad Beans—May, 1957.
2451 Control of Root-Knot or Eelworm by Soil Fumigation with D-D—Mar., 1948.
2535 The Effect of Soil Fungicides and Fumigants on Growth of Subterranean Clover on New Light Land—Mar., 1958.
2546 List of Plant Parasitic Eelworms Recorded in W.A. —May, 1958.
2548 Pear Scab—May, 1958.

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1035 Raising Turkeys—Nov., 1955.
1057 Muscovy Ducks—Sept., 1951.
2001 Incubator Hygiene—May, 1952.
2002 Planning Boosts Poultry Profits—May, 1952.
2007 Hints on Chicken Rearing—July, 1952.
2025 Thin-Shelled Eggs—Jan., 1953.
2074 Infectious Laryngo-Tracheitis—June, 1948.
2120 Deep Litter for Poultry—Part 1—Jan., 1954.
2138 Blackhead in Turkeys—Mar., 1954.
2154 Deep Litter for Poultry—Part 2—May, 1954.
2157 Rearing of Chickens—Sept., 1947.
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2212 Antibiotics in Poultry—Nutrition—Nov., 1954.
2232 Leucosis in Fowls—Jan., 1955.
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2265 Poultry Sanitation—May, 1955.

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2283 Fowl Pox—July, 1955.
2287 Geese—Notes on Feeding, Breeding and Management—Sept., 1955.
2338 Management and Diseases of Cage Birds—Mar., —1956.
2373 Caponising Cockerels—Sept., 1956.
2401 Seven Factors in Profitable Poultry Farming—Nov., 1956.
2423 Teaching Chickens to Perch—Jan., 1957.
2482 Pullorum-Tested Poultry Flocks—Sept., 1957.
2500 A Turkey-Raising Experiment—Jan., 1958.
2504 Some Poultry Pests—Jan., 1958.
2516 Household Poultry-Keeping—Jan., 1958.
2539 Selecting and Preparing Table Poultry—May, 1958.

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1091 Sheep Crutching Technique—Mar., 1952.
2004 Training a Sheep Dog—July, 1952.
2049 "Scabby Mouth" in Sheep—Dec., 1949.
2068 Toxic Paralysis (Botulism) of Farm Animals—Dec., 1940.
2072 Tetanus in Farm Animals—Sept., 1947.
2078 Rearing Orphan Lambs—July, 1953.
2099 Footrot in Sheep—Nov., 1953.
2137 The Breeding of Farm Animals—Mar., 1954.
2143 Sheep Blowfly Problem—Nov., 1954.
2209 Contagious Ophthalmia (Pinkeye) of Sheep—Nov., 1954.
2227 Copper and Cobalt Deficiency of Livestock in W.A. —Jan., 1955.
2228 Clover Disease—Jan., 1955.
2233 Lice and Tick in Sheep—Jan., 1955.
2234 Shearing Schools—Jan., 1955.
2253 Vaccines and Vaccination—Mar., 1955.
2257 Mycotic Dermatitis (Lumpy Wool) and Fleece Rot of Sheep—May, 1955.
2270 Classing Small Clips—Sept., 1955.
2299 A Simple Aid to Footrot Control—Nov., 1955.
2307 Paratyphoid (Salmonellosis) in Sheep—Nov., 1955.
2321 Veterinary Science and the Veterinary Profession —Jan., 1956.
2328 The Sheep Itch Mite—Mar., 1956.
2330 Caseous Lymphadenitis (Cheesy Gland) of Sheep —Mar., 1956.
2340 Lucerne and Banana Trash for Sheep Feeding—Mar., 1956.
2359 Arthritis in Lambs—May, 1956.
2364 Urinary Calculi of Sheep in W.A.—July, 1956.
2377 Woolbranding of Sheep—Sept., 1956.
2385 "Clover Disease" of Sheep in W.A.—Sept., 1956.
2394 Blowfly Strike—Nov., 1956.
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2407 Stock Disease Control by Correspondence—Nov., 1956.
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2445 Glycerine for Pregnancy Toxaemia—May, 1957.
2446 Photosensitisation—May, 1957.
2459 Vitamin A Supplements for Sheep and Cattle—July, 1957.
2465 Minerals for Livestock—July, 1957.
2468 Hypocalcaemia in Breeding Ewes (Milk Fever, Grass Tetany)—Sept., 1957.
2487 Worms in Sheep—Nov., 1957.
2492 Aids to Wool Pressing and Handling—Nov., 1957.
2499 Grinding Shearing Combs and Cutters—Jan., 1958.
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824 Phosphatic Fertilisers—June, 1945.
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936 Zinc Deficiency of Flax—June, 1948.
983 Fertiliser Trials on Annual Pasture at Wokalup Research Station—Sept., 1949.
1074 Kimberley Soils Need Phosphates—Jan., 1952.
2020 The Regeneration and Maintenance of Wimmera Ryegrass Under Saline Soil Conditions—Nov., 1952.
2096 Soil Analyses—Sept., 1953.
2316 Sod Culture—A System of Orchard Soil Management—Jan., 1956.
2400 Handling Salt Land—Nov., 1956.
2414 Molybdenum for Sub-Clover—Jan., 1957.
2481 Fertiliser Trial with Potatoes at Manjimup—Sept., 1957.
2507 Light Land Development in the West Midlands—Jan., 1958.
2518 A Method of Inoculating and Lime-Pelleting Leguminous Seeds—Jan., 1958.
2529 Use of Copper and Zinc in the Cereal-Growing Districts of W.A.—Mar., 1958.
2535 Effect of Soil Fungicides and Fumigants on Growth of Sub-Clover on New Light Land—Mar., 1958.

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1052 Soil Salinity Investigations—June, 1951.
1054 *Paspalum Vaginatum* or Sea-Shore Paspalum—Jan., 1956.
2002 Water Erosion Control—2—May, 1952.
2005 Water Erosion Control—3—July, 1952.
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2030 Wind Erosion Control—Jan., 1953.
2042 Contour Furrows Increase Pasture Growth—Mar., 1953.
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2284 A New Model Hose Level—July, 1955.
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2318 Land Clearing Control in the Eastern Wheat Belt —Jan., 1956.
2323 Salt Land Survey, 1955—Feb., 1956.
2324 *Paspalum Vaginatum* for Salt Land—Jan., 1956.
2335 Build Contour Banks with a Disc Plough—Mar., 1956.
2355 Firebreaks and Soil Erosion—May, 1956.
2363 Farm Planning—May, 1956.
2393 Roaded Catchments for Farm Water Supplies—Sept., 1956.
2400 Handling Salt Land—Nov., 1956.
2515 Farm Planning—Fences and Soil Conservation—Jan., 1958.
2520 Farm Planning—Fences for Efficient Grazing—Mar., 1958.
2521 Gypsum for Salt Land—Mar., 1958.
2545 Farm Planning—Natural Cultivation Boundaries —May, 1958.

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2011 The Prevention of Sucker Growth in Tobacco After Topping—July, 1952.
2093 Tobacco Growers' Problems—Sept., 1953.
2160 Tobacco Seedling Production—May, 1954.
2173 The Control of Tobacco Pests in W.A.—July, 1954.
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2102 A Farm-Made Buckrake or Hay-Sweep—Nov., 1953.
2122 A Jeep-Operated Foliage Baiting Spray—Jan., 1954.
2164 The Care and Maintenance of the Farm Tractor—May, 1954.
2189 The Care and Maintenance of Binders—Sept., 1954.
2204 Tank Indicator Gauge—Nov., 1954.
2208 A Handy Drum-Tipping Cradle—Nov., 1954.
2226 Wheel Slip in Tractor Operations—Jan., 1955.
2238 Tractor Service Hints—Points on Battery Maintenance—Mar., 1955.

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2313 Tractor Service Hints—Preventive Maintenance—Jan., 1956.
2314 The Importance of Tractor Tests to the Practical Farmer—Jan., 1956.
2466 Tractors Can Kill—July, 1957.
2496 Stone Roller as Mowing Aid—Nov., 1957.

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2020 Flat-Topped Yate; Brown Mallet; Four-Winged Mallet—Nov., 1952.
2029 Coral-Flowered Gum; Lemon-Flowered Gum; White Mallee—Jan., 1953.
2038 Coolabah; Grey Box—Mar., 1953.
2064 *Eucalyptus Oleosa;* Red Tingle—May, 1953.
2082 Red Box; Forrest's Mallee—July, 1953.
2123 Dundas Mahogany; Gungunna; Round-Leaved Mallet—Jan., 1954.
2151 Marri; Spring Bloodwood; and Twin-Leaved Bloodwood—May, 1954.
2169 Four Northern Bloodwoods—July, 1954.
2195 Woollybutt—Gnaingar—Sept., 1954.
2254 Four Bloodwoods from the Kimberleys—Mar., 1955.
2443 Manna Wattle—May, 1957.

VEGETABLES

1030 Some Facts and Suggestions in Connection with the Grading of Potatoes—June, 1940.
2360 A Guide to Vegetable Growing—(Price 4s. 2d. posted, or 3s. 6d. at counter).
2131 Peanut Growing on the Levee Soils of the Gascoyne River—Mar., 1954.
2252 The Lakeland Tomato—Mar., 1955.
2295 Better Potato Yields—Sept., 1955.
2460 Suberisation of Cut Potato Setts—July, 1957.
2481 Fertiliser Trial with Potatoes at Manjimup—Sept., 1957.
2537 Winter Tomato Production—Mar., 1958.
2549 Tomato Fruit Quality—Effect of Mechanical Injury—May, 1958.

VERMIN

438 Vermin Poisoning—Mar., 1952.
2035 Wild Dog and Dingo Destruction—Part 1—Mar., 1953.
2061 Wild Dog and Dingo Destruction—Part 2—May, 1953.
2067 Poison Trails for Rabbit Destruction—July, 1953.
2081 Wild Dog and Dingo Destruction—Part 3—July, 1953.
2113 Aerial Baiting Against Wild Dogs and Foxes in W.A.—Jan., 1954.
2201 Wild Dog and Dingo Destruction—Part 4—Nov., 1954.
2215 A Kangaroo Disease—Nov., 1954.
2222 Rabbit Control with "1080"—Nov., 1954.
2223 Wild Dogs and Dingoes in W.A.—Jan., 1955.
2248 As Cunning as a Fox—Mar., 1955.
2303 Trapping Yards for Kangaroos—Nov., 1955.
2308 Rabbit Damage to Pastures—Nov., 1955.
2309 The New Approach to Rabbit Poisoning "1080" and Improved Methods—Jan., 1956.
2310 Co-ordinated Rabbit Control Using "1080"—Jan., 1956.
2327 Rabbits in the Karri Country—Mar., 1956.
2402 Myxomatosis—It's Progress and Future in W.A.—Nov., 1956.
2461 Rabbits are Scarce—Make Them Scarcer Still—July, 1957.
2479 Organised Vermin Control—Sept., 1957.

WEEDS, POISON PLANTS

103 Zamia Palm—1923.
158 Common Thornapple—June, 1935.
663 Poison Plants of the Gascoyne Stock Route—June, 1942.
1047 Large Scale Chemical Weed Control in Crops—Mar., 1951.
1076 Pituri—Jan., 1952.
2002 Hydrocyanic Acid Poisoning from Poison Rush—May, 1952.
2008 *Gastrylobium* and *Oxylobium*—July, 1952.
2009 Poison Sedge and Cyanogenesis—July, 1952.
2015 The Wedge-Leaved Rattlepod—Sept., 1952.
2041 Thornapples—Mar., 1952.
2050 Crop Spraying with Hormone-Like Weedkillers—May, 1953.
2085 *Euphertia*—Toxic Species of the Genus—July, 1953.
2149 Cape Tulip—May, 1954.
2152 The Chemical Control of Wild Radish—May, 1954.
2153 The Native Pear as a Toxic Plant—May, 1954.
2165 Ironwood—July, 1954.
2170 Some Chemical Trials with Doubliegee—July, 1954.
2192 Water Hyacinth—Sept., 1954.
2196 The Birdsville Indigo—Sept., 1954.
2225 Noogoora Burr—Jan., 1955.
2242 Wild Radish—Mar., 1955.
2245 Cabbage Poison—Mar., 1955.
2249 A Further Chemical Trial with Doublegee—Mar., 1955.
2263 Doublegee—May, 1955.
2276 Soursob—July, 1955.
2280 The Effect of Hormone-Like Herbicides on Dwalganup Subterranean Clover—July, 1955.
2286 Onion-Weed or Asphodel—Sept., 1955.
2305 Geraldton Carnation Weed or False Caper—Nov., 1955.
2317 Mesquite (*Prosopis juliflora* D.C.)—Jan., 1956.
2329 Bathurst Burr—Mar., 1956.
2349 Thornapple—May, 1956.
2367 Berkheya Thistle—July, 1956.
2379 Paterson's Curse—Sept., 1956.
2392 St. John's Wort—Nov., 1956.
2416 Blackberry or Bramble—Jan., 1957.
2426 Saffron Thistle—Mar., 1957.
2440 Sorrel—May, 1957.
2455 Nut Grass—July, 1957.
2470 Bindweed—Sept., 1957.
2494 Canada Thistle—Nov., 1957.
2503 Stinkwort—Jan., 1958.
2514 Some Points on Using Weed Spraying Equipment—Jan., 1958.
2523 Ragwort—Mar., 1958.
2542 Prickly Pear—May, 1958.

LIST OF REGISTERED STOCK FOODS AND STOCK LICKS, 1958-59

(By H. G. CARISS, Inspector of Feeding Stuffs.)

STOCK FOODS

All foods for stock sold in Western Australia are required by the Feeding Stuffs Act, 1928-1951, to be registered annually with the Department of Agriculture. For the purposes of the Act, "Foods for Stock" includes stock licks, which in turn embrace all preparations claimed to supply or primarily intended to supply mineral matter to stock.

The registration year for stock foods commences on July 1 each year. When making application for registration manufacturers must submit a guaranteed analysis for each of their products, together with a list of ingredients used in each stock food. Regular inspection and sampling is carried out by officers of the Department to see that stock foods comply with the registered analysis.

Sellers of stock foods are required by the Feeding Stuffs Act to ensure that to each package is clearly and conspicuously attached a label or brand showing the name and place of business of the manufacturer or importer, the registered brand and name of the food or lick and the registered analysis.

A list of stock foods and stock licks which have been registered for the current registration year appears hereunder, together with a list of results of analysis of official samples taken by Departmental inspectors.

Before purchasing any food or lick, buyers are advised to consult the list of registered stock foods and stock lists from which a comparison of foods or licks of similar types can be made and also to ensure that packages are correctly labelled. If any doubts arise, inquiries should be made at the Department of Agriculture, where information on the provisions and requirements of the Feeding Stuffs Act and advice on other aspects of stock feeding can be obtained.

Stock Food	Applic. No.	Brand	By whom registered	Materials from which made	Registered Analysis						
					Crude Protein	Crude Fat	Crude Fibre	Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Calcium (Ca)	Percentages of other substances claimed to be of reputed Medicinal or Nutritive Value
					% (Min.)	% (Max.) (Min.)	% (Max.)	% (Max.) (Min.)	% (Max.) (Min.)	% (Max.) (Min.)	%
A.—Simple Foods											
1.—Meat Meals.											
Meat Meal	29	Coogee	Anchorage Butchers Pty. Ltd.	Waste meat products	36·0	18·0	2·0	1·0 *nil*	12·5 9·0	12·5 8·0	
Do.	46	Midland	The Midland Junction Abattoirs	Abattoir offal	5·0	15·0 12·0	2·0				
Do.	47	Watsonia *	Watson's Foods Pty. Ltd.	do.	27·0	19·7 17·7	1·5	....	17·3 15·3	15·5 13·5	
Do.	89	W.A.M.E.	The West Australian Meat Export Works	Meat bone and blood	50·0	13·0	2·0	2·0 *nil*	12·0 7·0	11·0 6·0	
Do.	136	N.Z.	Burridge & Warren Pty. Ltd.	Animal blood and bone	47·0	8·0	1·6	0·46*	....	11·4*	
2.—Meat and Bone Meals.											
Bone and Meat Meal	32	Apex	Furguson's (By-Products) Pty. Ltd.	Green bones, meat and blood	37·0	12·0	2·0	1·0 *nil*	15·0 5·0	15·0 5·0	
Do. do.	33	Star	do. do. do.	do. do. do.	50·0	12·0	2·0	1·0 *nil*	11·0 6·0	10·0 5·0	

* Minimum.

Stock Food	Applic. No.	Brand	By whom registered	Materials from which made	Registered Analysis: Crude Protein	Crude Fat	Crude Fibre	Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Calcium (Ca)	Percentages of other substances claimed to be of reputed Medicinal or Nutritive Value
A.—Simple Foods—*continued.*					% (Min.)	% (Max.) (Min.)	% (Max.)	% (Max.) (Min.)	% (Max.) (Min.)	% (Max.) (Min.)	%
2.—Meat and Bone Meals—continued.											
Bone and Meat Meal	69	Pennell's	E. J. Fry Pty. Ltd.	Meat and bone	50·0	12·0	4·0	1·2 0·5	14·0 10·0	14·0 10·0	
Feeding Meat and Bone Meal	70	Mercury	H. C. Sleigh Ltd.	Animal meat and bone	45·0	13·0 11·0	1·5	0·6 0·5	20·0 17·1	13·0 11·3	
Bone and Meat Meal	90	Kitchen's	J. Kitchen & Sons Pty. Ltd.	Animal fat and bone	42·5	10·0 7·0	2·5	1·5 *Nil*	18·0 13·0	15·2 11·0	
Protein Meat and Bone Meal	97	Champion	Sims Cooper (Freezing Works) Pty. Ltd.	Meat Works offal	50·0	18·0 8·0	5·0	1·0 0·2	10·5 8·5	8·0 5·0	
Meat and Bone Meal	161	T.B. & S. in Diamond	Thomas Borthwick & Sons (A/Asia.) Ltd.	Animal offals	45·0	20·0	4·0	....	10·0 8·0	9·0 6·0	
Do. do.	167	Nutro-Protein	Nutritional Products Pty. Ltd., c/o. Amalgamated Labs. (W.A.)	Animal offal	52·0	7·0*	4·0				
Do. do.	230	A.J.B.	A. J. Bush & Sons (Manufacturers) Pty. Ltd.	Bones, fats and offals	45·0	10·0 7·0	1·5	....	18·0 12·0		
3.—Whale Meals.											
Whale Meal "B"	45	Cheynes Beach	Cheynes Beach Whaling Co. Ltd.	Whale meat and bones	55·0	6·0 4·0	5·0	2·5 1·0	16·0 14·0	15·0 13·0	
Whale Meal "A"	79	do.	do. do. do.	do. do.	60·0	6·0 4·0	5·0	2·5 1·0	16·0 14·0	15·0 13·0	
Whale Meal	138	N.W.W.	Nor'-West Whaling Co. Ltd.	Humpback whales	66·0	5·0	1·0	1·5 0·5	10·0 7·0	11·0 8·0	
Whale Meal 64%	236	do.	do. do. do.	do.	64·0	5·0	1·0	1·5 0·5	10·0 7·0	11·0 8·0	
4.—Whale Solubles.											
Spray Dried Whale Solubles	139	do.	do. do. do.	do.	82·0	0·4	0·1	2·5 0·5	1·5 1·0	1·5 1·0	
5.—Fish Meals.											
Cray Meal	28	Ancho	Anchorage Butchers Pty. Ltd.	Waste crayfish products	36·0	12·0 9·0	10·0	3·5 2·5	7·0 4·0	14·0 11·0	
6.—Milk Foods.											
Skim Milk Powder	59	Peter's	Peter's Creameries (W.A.) Pty. Ltd.	Skim milk	35·3	0·25*	1·0	1·78	2·41	1·29	Lactose 55·0
Dried Buttermilk Powder	92	Sunny West	Sunny West Co-op. Dairies Ltd.	Buttermilk	29·0	11·0 2·0	0·5	*Nil* 3·0 1·0	*Nil* 2·5 1·5	*Nil* 1·5 0·5	Ash 8·6 Carbohydrate 43·9
Dried Skim Milk Powder	93	do.	do. do. do.	Liquid milk	34·0	2·0	0·5	2·0 1·0	3·0 2·0	2·0 1·0	Lactose 48·0
Protein Feed Supplement	166	Nutro-Mye.	Nutritional Products Pty. Ltd., c/o. Amalgamated Labs. (W.A.)	Milk, sugar and skim milk powder	37·0	5·4	11·7	..	2·8	4·8	Riboflavin 18·0 mg.lb. Thiamine 19·0 mg.lb. B12 40·0 mg.lb.
Buttermilk Powder	168	Watsonia	The Capel Dairy Co. Pty. Ltd.	Buttermilk	29·3	7·0*	*Nil*	1·37	2·05	1·05	Lactose 45·0
7.—Yeast Products.											
Brewers Dried Yeast	94	B.D. Yeast	Ken McGibbon & Co.	Brewery yeast	45·0	1·5*	1·5	....	....	13·0 11·0	
Yeast Tonic	241	Blue Peter	Agricultural Products Co.	Brewers dried yeast	45·0	1·5*	1·5	....	....	11·0*	
8.—Wheat Products.											
Wheatmeal	86	Millers	W. H. Milne & Co. Pty. Ltd.	Wheat	8·0	....	5·0				

Do.	224	"C" Meal	W. Thomas & Co. (W.A.) Ltd.	do.	8·0	....	10·0				
9.—*Oil Seed Meals.*											
Meggitt's Linseed Oil Meal	148	M.L.M.	Elder Smith & Co. Ltd.	Linseed	35·0	6·0 3·5	10·0				
10.—*Molasses Products.*											
Powdered Molasses	87	Drimolas	Page Boy Products (W.A.)	Molasses	10·6	5·5*	6·6	....	....	....	Ash 5·8
Proteinised Molasses Block	137	Molactrate	Wm. Haughton & Co. Ltd.	Cane molasses, magnesium sulphur phosphates, meat extractive from animal protein, concentrated whey extract, calcium, potassium salt, cobalt, copper, iodine	17·5	3·0 *Nil*	*Nil*	5·5 4·0	4·5 2·0	4·5 2·0	Potassium 6·0 3·0 Ash 14·4 Sugar 44·6 Copper ppm 6·0 4·0 Cobalt ppm 3·0
Molasapol	248	Mayco	The Maylands Milling Co. Pty. Ltd.	Molasses, bran, pollard	7·5	3·0 2·0	4·0	....	1·0 0·5	1·0 0·4	
B.—Compound Foods.											
1.—*Cattle Foods.*											
Cattle Food	56	Eve-Lyn	Tropical Traders & Patersons Ltd.	Gristed wheat, barley, rye, pollard, salt, limestone, chalk, animal charcoal, molasses, sulphur, sulphate of iron, copper sulphate, medicinal herbs	5·0	2·0 1·0	5·5	13·0 12·0	4·25 3·25	9·5 8·5	Sulphur 3·6
11% Sweetened Dairy Meal	121	Wesfarmers	Westralian Farmers Co-op. Ltd.	Bran, pollard, oat meal, meat meal, brewers grain, bone meal, limestone, salt, molasses	11·0	5·0 2·5	10·0	2·0 0·5	2·0 1·0	2·5 2·0	Copper Trace Cobalt Trace
16% Sweetened Dairy Meal	122	do. ..	do. do. do.	Bran, pollard, wheat germ, peanut and coconut meals, brewers grain, rolled wheat, meat meal, bone meal, limestone, salt, bluestone	16·0	5·0 2·5	10·0	3·5 2·0	3·5 2·3	2·5 2·0	
Sweet Dairy Food	150	Browne's	Brownes Dairy Ltd. ..	Bran, pollard, grain meals, brewers grain, phosphate urea, molasses, lime, sodium chloride, calcium, cobalt, stabilised iodine	16·0	5·82 5·0	14·9	2·0 1·0	2·5 1·0	4·0 1·0	
11% Protein Sweet Dairy Food	207	Thomas	W. Thomas & Co. (W.A.) Ltd.	Bran, pollard, gristed grains, malt combings, molasses, oyster flour, sodium chloride, manganese sulphate, iodine, cobalt sulphate, Christmas phos.	11·0	1·5*	10·0	2·0 1·0	2·5 1·0	4·0 1·0	Manganese 60·0 ppm Iodine 1·2 ppm Cobalt 3·0 ppm
16% Protein Sweet Dairy Food	208	do. ..	do. do. do.	do. do. do. plus urea	16·0	1·5*	10·0	2·0 1·0	2·5 1·0	4·0 1·0	Manganese 60·0 ppm Iodine 1·2 ppm Cobalt 3·0 ppm
20% Protein Sweet Dairy Food	209	do.	do. do. do.	do. do. do.	20·0	1·5*	10·0	2·0 1·0	2·5 1·0	4·0 1·0	Manganese 60·0 ppm Iodine 1·2 ppm Cobalt 3·0 ppm
32% Dairy Cake Concentrate	211	do.	do. do. do.	Linseed meal, peanut meal, coconut meal, whale meal, urea pollard, oyster flour, sodium chloride, manganese sulphate, Christmas phos., stabilised iodine, cobalt	32·0	1·5*	5·0	5·0 2·0	8·5 3·5	9·0 4·0	Manganese 600·0 ppm Iodine 10·2 ppm Cobalt 30·0 ppm
16% Protein Sweet Dairy Nuts	212	do.	do. do. do.	Bran, pollard, gristed grains, malt combings, urea, molasses, oyster flour, sodium chloride, manganese sulphate, iodine, cobalt sulphate, Christmas phos.	16·0	1·5*	10·0	2·0 1·0	2·5 1·0	4·0 1·0	Manganese 60·0 ppm Iodine 1·2 ppm Cobalt 3·0 ppm
Lin Meal	238	Western	David Gray & Co. Ltd.	Malt grains, linseed meal, yeast, whale solubles, pollard, wheat cereals, cobalt chloride, copper sulphate, manganese sulphate	20·0	7·0*	5·0	1·5 0·5	1·5 0·5	1·0 0·15	
2.—*Calf Foods.*											
Calf Food	44	Harper's Star	Robert Harper & Co. Ltd.	Wheat, oats, rice, barley, linseed, mustard, branning, whiting, salt, peas	12·0	2·5*	10·0	2·0 1·0	2·5 1·0	1·0 0·25	

* Minimum.

Stock Food	Applic. No.	Brand	By whom registered	Materials from which made	Registered Analysis: Crude Protein	Crude Fat	Crude Fibre	Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Calcium (Ca)	Percentages of other substances claimed to be of reputed Medicinal or Nutritive Value
B.—Compound Foods—*continued.*					% (Min.)	% (Max.) (Min.)	% (Max.)	% (Max.) (Min.)	% (Max.) (Min.)	% (Max.) (Min.)	%
2.—Calf Foods—contd.											
Calf Food	54	Eve-Lyn	Tropical Traders & Patersons Ltd.	Gristed wheat, barley, rye, pollard, linseed, salt, sugar, chalk turmerice, sodium bi-carbonate, cream of tartar, copper sulphate, foenugreek, coriander	8·5	2·0*	3·86	3·5 2·5	1·25 0·25	1·0 0·2	Sulphur 1·76 Carbohydrates 66 45
Calf Food	73	Kaf-O-Vite	Goldsbrough Mort & Co. Ltd.	Wheaten and rice pollard, barley meal, meat meal, wheat meal, coconut meal, peanut meal, calcium carbonate, bone charcoal, sugar	16·0	7·0 6·0	8·0	....	0·95	....	Lime (CaO) 1·7
Calf Meal "A-B" (A and D_3)	120	Wesfarmers ..	Westralian Farmers Co-op. Ltd.	Pollard, buttermilk, linseed meal, dried yeast, wheatmeal, wheat germ, meat meal, limestone, bone meal, antibiotics and stabilised vitamins A and D_3	20·0	5·0 3·0	3·0	2·0 0·5	2·3 1·5	1·5 1·0	Vitamin A 2,000 I.U./lb. Vitamin D_3 150 I.U./lb.
20% Protein Vitamised Antibiotic Calf Food	210	Thomas ..	W. Thomas & Co. (W.A.) Ltd.	Linseed and coconut meal, pollard, boneflour, and Christmas phos., oyster flour, sodium chloride, manganese sulphate, stabilised iodine cobalt sulphate, stabilised vitamins A and D_3 and procaine penicillin	20·0	2·5*	8·0	3·0 0·5	2·5 0·2	2·5 0·5	Iodine 1·2 p.p.m. Cobalt 3·0 p.p.m. Manganese 60·0 ppm. Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton
Calf Food	237	Western	David Gray & Co. Ltd.	Malt grains, milk powder, yeast, whate solubles, pollard, wheat cereals, trace elements, linseed meal, coconut meal	16·0	6·0*	7·5	1·5 0·5	1·5 0·5	1·0 0·15	
3.—Sheep Foods.											
Phosphate Cubes	22	Wesfarmers	Westralian Farmers Co-op. Ltd.	Ground rock phosphate, pollard cobalt chloride	2·0	2·0 *Nil*	7·0	1·0 *Nil*	25·0 15·0	5·0 *Nil*	
Ewe and Lamb Sheep Nuts	53	Western	Hemphill Gray Oil Mills Pty. Ltd.	Malt grains, yeast, linseed, meat meal, whale solubles, molasses, wheat, rye, barley	21·0	4·0 3·0	7·5	1·5 0·5	1·5 1·0	2·0 1·0	Copper Trace Cobalt Trace
Sheep Food	57	Eve-Lyn	Tropical Traders & Patersons Ltd.	Gristed wheat, barley and rye, pollard, salt, limestone, chalk sulphur, animal charcoal, molasses, sulphate iron, copper sulphate (Trace), medicinal herbs	5·0	2·0 1·0	5·0	13·5 12·5	4·0 3·5	9·6 8·6	Sulphur 2·75
Sheep Breeder Cubes....	124	Wesfarmers	Westralian Farmers Co-op. Ltd.	Bran, pollard, wheat meal, wheat germ, peanut meal, meat meal, limestone, salt, cobalt, copper	18·0	8·5 7·5	7·5	3·5 2·0	4·5 3·5	2·5 2·0	Copper Trace Cobalt Trace
Maintenance Sheep Cubes	125	Wesfarmers ..	Westralian Farmers Co-op. Ltd.	Bran, pollard, wheat meal, wheat germ, peanut meal, meat meal limestone, salt, cobalt, copper	14·0	6·0 4·5	6·5	3·5 2·0	3·5 2·3	2·5 2·0	Copper Trace Cobalt Trace
11% Protein Vitamised Maintenance Sheep Nuts	219	Thomas	W. Thomas & Co. (W.A.) Ltd.	Bran, pollard, grain meals, molasses, oyster flour, sodium chloride, vitamins A and D_3, Christmas phos.	11·0	1·0*	15·0	2·0 1·0	2·0 0·5	3·5 1·5	Cobalt 3·0 ppm Iodine 1·2 ppm Manganese 60·0 ppm Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton

21% Protein Vitamised, Ewe, Lamb and Breeders Nuts	220	do.	do. do. do.	Peanut meal, linseed meal, pollard, bran, urea, grain meals, molasses, oyster flour, sodium chloride, vitamins A and D_3, Christmas phos.	21·0	2·0*	11·5	4·0 2·0	3·0 1·0	4·0 2·0	do. do.
30% Linseed Oil Meal Sheep Nuts	221	do.	do. do. do.	Pure linseed oil meal	30·0	3·0*	12·0				
4.—Poultry Foods.											
Deworming Pellets	1	Red-Comb ..	Westralian Farmers Co-op. Ltd.	Bran, pollard, wheat meal, piperazine adipate	4·0	7·0 5·0	7·0	2·0 0·5	2·0 0·1	2·0 0·1	Piperazine Adipate 0·3
Poultry Breeders Pellets A and D_3	2	do. .	do. do. do.	Bran, pollard, wheat meal, whale meal, meat meal, buttermilk, bone meal, brewers yeast, oyster flour, manganese sulphate, lucerne meal, wheat germ, stabilised vitamins A and D_3	18·0	7·0 5·0	7·0	2·0 *Nil*	4·0 2·0	2·5 1·0	Vitamin A 3,400 I.U./lb. Vitamin D_3 350 I.U./lb.
Poultry Breeders Pellets A and D_3	3	Wesfarmers	do. do. do.	do. do. do.	18·0	7·0 5·0	7·0	2·0 *Nil*	4·0 2·0	2·5 1·0	do. do.
Laying Cage Mash A and D_3	4	do.	do. do. do.	Bran, wheat meal, whale meal, meat meal, tricalos, manganese sulphate, salt, oyster flour, lucerne meal, stabilised vitamins A and D_3	17·0	7·0 5·0	7·0	3·0 1·0	4·0 2·0	2·5 1·0	do. do.
Laying Cage Pellets A and D_3	5	Red-Comb	do. do. do.	do. do. do.	17·0	7·0 5·0	7·0	3·0 1·0	4·0 2·0	2·5 1·0	do. do.
Deworming Mash	23	Wesfarmers ..	do. do. do.	Bran, pollard, wheat meal, piperazine, Adipate	4·0	7·0 5·0	7·0	2·0 0·5	2·0 0·1	2·0 0·1	Piperazine Adipate 0·3
Laying Mash	26	Hamptons ...	Hamptons Poultry Stud	Wheat, bran, pollard, whale meal, milk powder, brewers yeast, bone meal, oyster flour, vitamins A and D_3	20·0	3·0 2·0	4·0	1·0 0·3	2·5 1·0	2·5 1·0	
Laying Mash No. 1	41	Wrights	Wrights Ltd.	Bran, pollard, wheat meal, meat meal, whale meal, bone meal, gristed oats, oyster flour, common salt	16·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	
Vitamin A and D_3, Fortified Laying Mash No. 1	42	do.	do. do. do.	do. do. do.	16·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 6,000,000 I.U./ton
Special Laying Mash	51	Mayco	The Maylands Milling Co. Ltd.	Bran, pollard, meat meal, wheat meal, bone meal, shell grit, salt	17·0	4·0 3·5	5·0	1·0 0·15	3·0 2·5	3·5 3·0	
Laying Mash No. 1	63	Gardners	Gardner Bros.	Bran, pollard, meat meal, wheat meal, whale meal, bone meal, oyster flour, gristed oats, common salt	16·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	
Laying Mash A and D_3	66	Apex	E. J. Fry Pty. Ltd.	Bran, pollard, meat meal, wheat meal, bone meal, oyster flour, whale meal, stabilised vitamins A and D_3	16·0	3·0*	6·0	1·0 0·25	3·0 1·1	3·0 2·0	Vitamin A 3,000 I.U./lb. Vitamin D_3 300 I.U./lb.
Laying Mash	67	do.	do. do. do.	Wheat meal, bran, pollard, meat meal, bone meal, oyster flour, whale meal	16·0	3·0*	6·0	1·0 0·25	3·0 1·1	3·0 2·0	
Laying Mash	68	K.B.	do. do. do.	do. do. do.	18·0	4·5 3·5	7·0	2·0 0·25	4·0 1·2	5·0 1·9	
Laying Mash No. 1	82	Millers	W. H. Milne & Co. Pty. Ltd.	Bran, pollard, wheat meal, whale meal, meat meal, bone meal, gristed oats, oyster flour, common salt	16·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	
16% Laying Mash Vitamin A and D_3 Fortified	83	do.	do. do. do.	do. do. do. plus vitamins A and D_3	16·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 600,000 I.U./ton
18% Laying Mash, A and D_3 Fortified	84	do.	do. do. do.	Bran, pollard, wheat meal, meat meal, whale meal, gristed oats, oyster flour, salt, bone meal, vitamins A and D_3	18·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	do. do.

* Minimum.

Stock Food	Applic. No.	Brand	By whom registered	Materials from which made	Registered Analysis						
					Crude Protein	Crude Fat	Crude Fibre	Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Calcium (Ca)	Percentages of other substances claimed to be of reputed Medicinal or Nutritive Value
B.—Compound Foods—*continued.*					% (Min.)	% (Max.) (Min.)	% (Max.)	% (Max.) (Min.)	% (Max.) (Min.)	% (Max.) (Min.)	%
4.—Poultry Foods—ctd.											
Fattening Mash	85	Millers	W. H. Milne & Co. Pty. Ltd.	Bran, pollard, gristed oats, salt, meat meal, wheat meal, limestone	13·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	
"P" All Mash	101	Wesfarmers	Westralian Farmers Co-op. Ltd.	Bran, pollard, rolled wheat, bonemeal, gristed oats, meat meal, or whale solubles, oyster flour	16·0	6·0 4·0	7·0	1·0 *Nil*	3·5 2·3	2·5 2·0	
"P" All Mash A and D_3	102	do.	do. do. do.	do. do. do. plus vitamins A and D_3	16·0	6·0 4·0	7·0	1·0 *Nil*	3·5 2·3	2·5 2·0	Vitamin A 3,300 I.U./lb. Vitamin D_3 450 I.U./lb.
Hi-Protein Mash	103	do.	do. do. do.	Bran, pollard, wheat, meat meal, whale meal, bone meal, shell dust	20·0	10·0 6·0	8·0	0·5 0·1	5·0 4·0	2·5 1·5	
Hi-Protein Mash A and D_3	104	do.	do. do. do.	do. do. do. plus vitamins A and D_3	20·0	10·0 6·0	8·0	0·5 0·1	5·0 4·0	2·5 1·5	Vitamin A 6,640 I.U./lb. Vitamin D_3 900 I.U./lb.
All Mash Pellets	112	Red-Comb	do. do. do.	Bran, pollard, rolled wheat, oat meal, meat meal, bone meal, oyster flour	16·0	6·0 4·0	7·0	1·0 *Nil*	3·5 2·3	2·5 2·0	
All Mash Pellets A and D_3	113	do.	do. do. do.	do. do. do. plus vitamins A and D_3	16·0	6·0 4·0	7·0	1·0 *Nil*	3·5 2·3	2·5 2·0	Vitamin A 3,300 I.U./lb. Vitamin D_3 450 I.U./lb.
Hi-Protein Pellets	114	do.	do. do. do.	Bran, pollard, wheat, meat meal, whale meal, bone meal, shell dust	20·0	10·0 6·0	8·0	0·5 0·1	5·0 4·0	2·5 1·5	
Hi-Protein Pellets A and D_3	115	do.	do. do. do.	do. do. do. plus vitamins A and D_3	20·0	10·0 6·0	8·0	0·5 0·1	5·0 4·0	2·5 1·5	Vitamin A 6,640 I.U./lb. Vitamin D_3 900 I.U./lb.
H.P. Laying Mash Vitamin A and D_3 Fortified	140	Morlay	R. B. Young Products Pty. Ltd.	Wheat meal, bran, pollard, meat meal, whale meal, bone meal, whale solubles, oyster flour, rock phosphate, minerals, apac	20·0	3·0*	5·5	3·0 0·25	3·0 1·0	4·0 1·5	Vitamin A 3,300 I.U./lb. Vitamin D_3 330 I.U./lb.
Laying Mash Vitamin A and D_3 Fortified	141	do.	do. do. do.	Bran, pollard, rock phosphate, apac, wheat meal, oyster flour, whale meal, meat meal, bone meal, minerals	16·0	3·0*	5·5	2·0 0·25	3·0 1·0	4·0 1·5	do. do.
Laying Mash	142	do.	do. do. do.	Wheat meal, pollard, bran, oyster flour, meat meal, whale meal and solubles, bone meal, rock phosphate, minerals	16·0	3·0*	5·5	2·0 0·25	3·0 1·0	4·0 1·5	
Duck Mash (Fattening)	147	do.	do. do. do.	Wheat meal, bran, pollard, meat meal, whale meal, minerals	11·0	3·0*	5·5	2·0 0·25	3·0 1·0	4·0 1·5	
Laying Mash	170	Parsons	Parsons Pty. Ltd.	Wheat germ, bran, pollard, gristed grains, whale meal, meat meal, blood meal, dried solubles, oyster flour, manganese sulphate, Christmas phos., sodium chloride	16·0	2·5*	6·0	2·0 0·25	3·5 1·0	3·75 1·0	
Special Laying Mash	179	Bairds	Bairds Pty. Ltd.	Bran, pollard, wheat meal, meat meal, bone meal, oyster flour, salt	17·0	4·0 3·5	5·0	1·0 0·75	3·0 2·5	3·5 3·0	

Laying Mash	183	Symonds	E. Symonds	Bran, pollard, gristed grains, wheat germ, whale meal, meat meal, blood meal, dried solubles, oyster flour, manganese sulphate, Christmas phos., salt	16·0	2·5*	6·0	2·0 0·25	3·5 1·0	3·75 1·0	
Laying Pellets	184	do.	do.	do. do. do.	16·0	2·5*	6·0	2·0 0·25	3·5 1·0	3·75 1·0	
16% Protein Laying Mash No. 1 (All Mash)	185	Thomas	W. Thomas & Co. (W.A.) Ltd.	do. do. do.	16·0	2·5*	6·0	1·0 0·25	3·5 1·0	3·75 1·0	
16% Protein Vitamised Laying Mash No. 1 (All Mash)	186	do.	do. do. do.	do. do. do. plus vitamins A and D_3	16·0	2·5*	6·0	1·0 0·25	3·5 1·0	3·75 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton
20% Protein Laying Mash	187	do.	do. do. do.	Bran, pollard, gristed grains, wheat germ, whale meal, dried solubles, meat meal, oyster flour, salt, manganese sulphate, Christmas phos.	20·0	2·5*	6·0	2·0 0·5	7·0 2·0	7·5 2·0	
20% Protein Vitamised Laying Mash	188	do.	do. do. do.	do. do. do. plus vitamins A and D_3	20·0	2·5*	6·0	2·0 0·5	7·0 2·0	7·5 2·0	Vitamin A 12,000,000 I.U./ton Vitamin D_3 3,500,000 I.U./ton
19% Breeders Mash	194	do.	do. do. do.	Bran, pollard, wheat meal, barley meal, whale meal, meat meal, skim milk powder, brewers yeast, Christmas phos., oyster flour, salt, manganese sulphate, riboflavin, vitamins A and D_3	18·0	2·5*	6·0	1·0 0·5	3·75 1·0	3·75 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton
16% Protein Laying Pellets No. 1 (All Pellets)	196	do.	do. do. do.	Bran, pollard, gristed grains, wheat germ, whale meal, dried solubles, meat meal, oyster flour, Christmas phos., manganese sulphate	16·0	2·5*	6·0	1·0 0·25	3·5 1·0	3·75 1·0	
16% Protein Vitamised Laying Pellets No. 1 (All Pellets)	197	do.	do. do. do.	Bran, pollard, gristed grains, wheat germ, whale meal, dried solubles, meat meal, oyster flour, vitamins A and D_3, Christmas phos., manganese sulphate	16·0	2·5*	6·0	1·0 0·25	3·5 1·0	3·75 1·0	do. do.
20% Protein Laying Pellets	198	do.	do. do. do.	Bran, pollard, gristed grains, wheat germ, whale meal, dried solubles, meat meal, oyster flour, Christmas phos., manganese sulphate	20·0	2·5*	6·0	2·0 0·5	7·0 2·0	7·5 2·0	
20% Protein Vitamised Laying Pellets	199	do. ...	do. do. do.	do. do. do. plus vitamins A and D_3	20·0	2·5*	6·0	2·0 0·5	7·0 2·0	7·5 2·0	Vitamin A 12,000,000 I.U./ton Vitamin D_3 3,600,000 I.U./ton
19% Breeders Pellets	205	do.	do. do. do.	Bran, pollard, wheat meal, barley meal, whale meal, meat meal, Christmas phos., salt, skim milk powder, dried brewers yeast, bone flour, oyster flour, manganese sulphate, riboflavin, Vitamins A and D_3	19·0	2·5*	6·0	1·0 0·5	3·75 1·0	3·75 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton
40% Vitamised Universal Poultry Concentrate	206	do.	do. do. do.	Whale meal, meat meal, fish meal, oyster flour, manganese sulphate, stabilised vitamins A and D_3, riboflavin, trace minerals, Christmas phos.	40·0	9·0	1·5	0·4 0·2	12·5 8·5	20·5 18·5	Vitamin A 40,000,000 I.U./ton Vitamin D_3 4,000,000 I.U./ton Vitamin B12 12 4G. per gram
Vitamised 16% Laymash	243	Richfoods	A. Richards & Co.	Wheat meal, meat meal, whale meal, oat meal, bone meal, bran, pollard, oyster flour, Vitamins A and D_3	16·0	6·0 4·0	7·0	1·0 *Nil*	3·5 2·3	2·5 2·0	Vitamin A 2,000 I.U./lb. Vitamin D_3 500 I.U./lb.
Vitamised 20% Laymash	244	do.	do. do.	do. do. do.	20·0	10·0 6·0	7·0	1·0 *Nil*	4·0 1·0	3·5 1·5	do. do.
16% Laymash	246	do.	do. do.	Wheat meal, meat meal, whale meal, oat meal, bone meal, bran, pollard, oyster flour	16·0	6·0 4·0	7·0	1·0 *Nil*	3·5 2·3	2·5 2·0	

* Minimum.

Stock Food	Applic. No.	Brand	By whom registered	Materials from which made	Registered Analysis: Crude Protein	Crude Fat	Crude Fibre	Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Calcium (Ca)	Percentages of other substances claimed to be of reputed Medicinal or Nutritive Value
B.—Compound Foods—*continued.* **4.—*Poultry Foods*—*ctd.***					% (Min.)	% (Max.) (Min.)	% (Max.)	% (Max.) (Min.)	% (Max.) (Min.)	% (Max.) (Min.)	%
Laying Mash	247	Mayco	Maylands Milling Co. Pty. Ltd.	Bran, pollard, wheat meal, meat meal, bonemeal, shellgrit, salt	16·0	4·0 3·5	5·0	1·0 0·75	3·0 2·5	3·5 3·0	
5.—*Chick Foods*											
"P" Chicken Mash "A" AB, A and D_3 with Nicarbazine	6	Wesfarmers	Westralian Farmers Co-op. Ltd.	Bran, pollard, cracked wheat, oat meal, meat meal, buttermilk, bone meal, antibiotics, stabilised vitamins A and D_3, nicarbazine	16·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	Vitamin A 2,000 I.U./lb. Vitamin D_3 180 I.U./lb. Nicarbazine 0·0125%
"P" Chicken Mash "B" A and D_3 with Nicarbazine	7	do.	do. do. do.	Bran, pollard, rolled wheat, oat meal, meat meal, buttermilk, bone meal, stabilised vitamins A and D_3, nicarbazine	15·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	Vitamin A 2,000 I.U./lb. Vitamin D_3 180 I.U./lb. Nicarbazine 0·0125%
Cockerel Mash "A" AB, A and D_3 with Nicarbazine	8	do.	do. do. do.	Gristed wheat, buttermilk, meat meal, brewers yeast, whale meal, bone meal, manganese sulphate, antibiotics, bran, stabilised vitamins A and D_3, nicarbazine	18·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	Vitamin A 2,000 I.U./lb. Vitamin D_3 400 I.U./lb. Nicarbazine 0·0125%
Cockerel Mash "B" A and D_3 with Nicarbazine	9	do.	do. do. do.	Gristed wheat, meat meal, whale meal, bran, bone meal, manganese sulphate, nicarbazine, vitamins A and D_3	18·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	do. do.
Chick Pellets "A" AB, A and D_3 with Nicarbazine	10	Red Comb	do. do. do.	Bran, pollard, cracked wheat, oat meal, meat meal, buttermilk, bone meal, stabilised vitamins A and D_3, antibiotics, nicarbazine	16·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	Vitamin A 2,000 I.U./lb. Vitamin D_3 180 I.U./lb. Nicarbazine 0·0125%
Chick Pellets "B" A and D_3 with Nicarbazine	11	do.	do. do. do.	Bran, pollard, rolled wheat, oat meal, meat meal, buttermilk, bone meal, stabilised vitamins A and D_3, nicarbazine	15·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	do. do.
Cockerels Pellets "A" AB, A and D_3 with Nicarbazine	12	do.	do. do. do.	Gristed wheat, bran, buttermilk, brewers yeast, meat meal, whale meal, bone meal, manganese, sulphate, antibiotics, stabilised vitamins A and D_3, nicarbazine	18·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	Vitamin A 2,000 I.U./lb. Vitamin D_3 400 I.U./lb. Nicarbazine 0·0125%
Cockerels Pellets "B" A and D_3 with Nicarbazine	13	do.	do. do. do.	Gristed wheat, bran, meat meal, bone meal, whale meal, manganese, sulphate, stabilised vitamins A and D_3, nicarbazine	18·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	do. do.
Chick Starter	24	Hamptons	Hamptons Poultry Stud	Wheat, bran, pollard, whale meal, milk powder, brewers yeast, bone meal, vitamins A and D_3, nicrazin	17·0	3·0 2·0	4·5	1·5 0·25	2·0 1·75	2·0 1·0	
Growing Mash	25	do.	do. do. do.	Wheat, bran, pollard, brewers yeast, bone meal, whale meal, vitamins A and D_3, apac	15·0	3·0 2·0	4·5	1·0 0·25	2·5 1·0	2·0 1·0	
Special Chick Starter	49	Mayco	Maylands Milling Co. Pty. Ltd.	Bran, pollard, meat meal, wheat meal, bone meal, shell grit, salt, riboflavin, emulsified fish oil	17·0	4·0 3·5	5·0	1·0 0·75	3·0 2·5	3·5 3·0	Manganese Sulphate 0·025
Growing Mash	50	do.	do. do. do.	Bran, pollard, meat meal, wheat meal, bone meal, shell grit, salt, riboflavin, emulsified fish oil	15·0	4·0 3·5	5·0	1·0 0·75	3·0 2·5	3·5 3·0	do. do.

Chick Food	52	H. & C.	Haynes & Clements	Wheat, maize, peas, grit....	9·0	3·0 1·5	4·5	....	....	....	Lime (CaO) 3·0
Chick Starter A and D_3	64	Apex	E. J. Fry Pty. Ltd.	Bran, pollard, wheat meal, meat meal, bone meal, buttermilk, vitamin A and D_3	17·0	3·0*	6·0	1·0 0·25 0·25	2·0 1·1 1·1	3·0 1·0 1·0	Vitamin A 3,000 I.U./lb. Vitamin D_3 300 I.U./lb.
Growers Mash A and D_3	65	do.	do. do. do.	Bran, pollard, wheat meal, meat meal, bone meal, buttermilk, vitamin A and D_3	15·0	3·0*	6·0	1·0 0·25	2·0 1·1	3·0 1·5	do. do.
Chickstarter	80	Millers	W. H. Milne & Co. Pty. Ltd.	Bran, pollard, wheat meal, whale meal, ribon, bone meal, gristed oats, salt, vitamins A and D_3	16·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 600,000 I.U./ton
Chick Builder	81	do.	do. do. do.	Bran, pollard, whale meal, bone meal, meat meal, gristed oats, salt, whale meal, vitamins A and D_3	15·0	6·0 3·0	6·0	1·5 0·75	3·0 1·0	3·5 1·0	do. do.
"P" Chick Mash "A" AB, A and D_3	98	Wesfarmers	Westralian Farmers Co-op. Ltd.	Bran, pollard, cracked wheat, oat meal, meat meal, buttermilk, bone meal, antibiotics, stabilised vitamins A and D_3	16·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	Vitamin A 2,000 I.U./lb. Vitamin D_3 180 I.U./lb.
"P" Chick Mash "B" A and D_3	99	do.	do. do. do.	Bran, pollard, rolled wheat, oat meal, meat meal, buttermilk, bone meal, vitamins A and D_3	15·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	do. do.
"P" Growers Mash A and D_3	100	do.	do. do. do.	Bran, pollard, rolled wheat, oat meal, meat meal, buttermilk, bone meal, vitamins A and D_3	14·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·5 1·0	do. do.
Cockerel Mash "A" AB, A and D_3	105	do.	do. do. do.	Gristed wheat, bran, buttermilk, brewers yeast, meat meal, whale meal, bone meal, manganese, sulphate, vitamins A and D_3	18·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	Vitamin A 2,000 I.U./lb. Vitamin D_3 400 I.U./lb.
Cockerel Mash "B" A and D_3	106	do.	do. do. do.	Gristed wheat, bran, meat meal, bone meal, whale meal, manganese sulphate, vitamins A and D_3	18·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	do. do.
Chick Pellets "A" AB, A and D_3	109	Red Comb	Westralian Farmers Co-op. Ltd.	Bran, pollard, cracked wheat, oat meal, meat meal, buttermilk, bone meal, stabilised vitamins A and D_3, antibiotics	16·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	Vitamin A 2,000 I.U./lb. Vitamin D_3 180 I.U./lb.
Chick Pellets "B" A and D_3	110	do.	do. do. do.	Bran, pollard, cracked wheat, oatmeal, meat meal, buttermilk, bone meal, stabilised vitamins A and D_3	15·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	do. do.
Growers Pellets "A" A and D_3	111	do.	do. do. do.	Bran, pollard, rolled wheat, oat meal, meat meal, bone meal, vitamins A and D_3	14·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·5 1·0	do. do.
Cockerel Pellets "A" AB, A and D_3	116	Wesfarmers	do. do. do.	Gristed wheat, bran, buttermilk, bone meal, brewers yeast, meat meal, whale meal, manganese sulphate, antibiotics, vitamins A and D_3	18·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	Vitamin A 2,000 I.U./lb. Vitamin D_3 400 I.U./lb.
Cockerels Pellets "B" A and D_3	117	do.	do. do. do.	Gristed wheat, bran, meat meal, bone meal, whale meal, manganese sulphate, vitamins A and D_3	18·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	do. do.
Chick Starter	143	Morlay	R. B. Young Products Pty. Ltd.	Wheat meal, bran, dried yeast, whale meal, meat meal, bone meal, shell grit, antibiotics, nefco, manganese sulphate, buttermilk, minerals, apac	18·0	3·0*	5·5	2·0 0·25	3·5 1·0	4·0 1·5	Vitamin A 3,300 I.U./lb. Vitamin D_3 330 I.U./lb.
Chick All Mash	144	do.	do. do. do.	Wheat meal, bran, meat meal, whale meal, bone meal, oyster shell grit, dried yeast, apac, nefco, manganese sulphate, minerals	15·0	3·0*	6·0	2·0 0·25	3·0 1·0	4·0 1·5	do. do.
Growing Mash (Vitamin Fortified) A and D_3	145	do.	do. do. do.	Wheat meal, bran, pollard, meat meal, whale meal, bone meal, oyster shell flour, dried yeast, ribon, minerals, apac	14·0	3·0*	5·5	3·0 0·25	3·0 1·0	4·0 1·5	do. do.

* Minimum.

Stock Food	Applic. No.	Brand	By whom registered	Materials from which made	Registered Analysis: Crude Protein	Crude Fat	Crude Fibre	Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Calcium (Ca)	Percentages of other substances claimed to be of reputed Medicinal or Nutritive Value
B.—Compound Foods—*continued.* 5.—*Chick Foods—contd.*					% (Min.)	% (Max.) (Min.)	% (Max.)	% (Max.) (Min.)	% (Max.) (Min.)	% (Max.) (Min.)	%
Chick Starter Pellets	157	Boans	Boans Ltd. . . .	Bran, pollard, crushed wheat, oat meal, meat meal, buttermilk, bone meal, vitamins A and D_3, antibiotics and nicarbazine	16·0	5·0 3·0	7·0	1·0 *Nil*	2·3 1·2	1·3 0·8	Vitamin A 2,000 I.U./lb. Vitamin D_3 180 I.U./lb. Nicarbazine 0·0125%
Special Chick Food	169	Parson's ...	Parson's Pty. Ltd. ..	Wheat, green peas, maize, sorghum seed, shell grit	8·0	1·5 0·5	4·5	0·5 *Nil*	1·0 0·5	4·0 3·0	. .
Fortified Chick Starter	177	Bairds	Bairds Pty. Ltd. ...	Bran, pollard, meat meal, whale meal, salt, butterfat, bone meal, oyster flour, riboflavin, vitamins A and D_3, manganese sulphate, terramycin (TM5)	17·0	4·0 3·5	5·0	1·0 0·75	3·0 2·5	3·5 3·0	Mang. Sulphate 0·025% Terramycin (TM5) ·075%
Fortified Growing Mash	178	do. ...	do. do. do.	Bran, pollard, wheat meal, meat meal, bone meal, oyster flour, riboflavin, salt, vitamins A and D_3, manganese sulphate, terramycin	15·0	4·0 3·5	5·0	1·0 0·75	3·0 2·5	3·5 3·0	do. do.
Chick Starter Mash ..	180	Wexham	Westralian Farmers Co-op. Ltd.	Bran, pollard, wheat meal, oat meal, whale meal, meat meal, buttermilk, brewers yeast, oyster flour, bone meal, lucerne meal	18·0	7·0 4·0	7·0	0·5 0·1	2·3 1·0	1·5 0·8	
Chick Starter	181	Symonds	E. Symonds	Bran, pollard, gristed grains, wheat germ, meat meal, whale meal, pea meal, oyster flour, riboflavin, procaine, penicillin, vitamins A and D_3, milk powder, manganese sulphate, lucerne pollard, Christmas phos.	18·0	2·5*	6·0	1·5 0·25	3·0 1·0	2·5 1·0	
Growers Mash ...	182	do.	do. do.	Bran, pollard, gristed grains, wheat germ, meat meal, whale meal, pea meal, oyster flour, riboflavin, procaine, penicillin, vitamins A and D_3, milk powder, manganese sulphate, lucerne pollard, Christmas phos.	15·0	2·5*	6·0	1·25 0·5	3·5 1·0	3·75 0·5	
18% Protein Antibiotic Vitamised Chick Starter	189	Thomas ...	W. Thomas & Co. (W.A.) Ltd.	Bran, pollard, gristed grains, wheat germ, meat meal, whale meal, pea meal, oyster flour, riboflavin, procaine, penicillin, vitamins A and D_3, milk powder, manganese su'phate, lucerne pollard, Christmas phos.	18·0	2·5*	6·0	1·0 0·25	3·0 1·0	2·5 1·0	Vitamin A 5,000,000 I.U./ton Vitamin D_3 1,500,000 I.U./ton
18% Protein Antibiotic Vitaminised Chick Starter with Nefco	190	do.	do. do. do.	Bran, pollard, gristed grains, wheat germ, meat meal, whale meal, pea meal, oyster flour, riboflavin, procaine penicillin, vitamins A and D_3, milk powder, manganese sulphate, lucerne, pollard, Christmas phos. and nitrofurazone (Nefco)	18·0	2·5	6·0	1·0 0·25	3·0 1·0	2·5 1·0	do. do.

15% Protein Vitaminised Chick Grower	191	do.	do.	do.	do.	Bran, pollard, gristed grains, wheat-germ, meat meal, whale meal, dried solubles, oyster flour, salt, vitamins A and D_3, riboflavin, Christmas phos., manganese sulphate	15·0	2·5*	6·0	1·0 0·5	3·5 1·0	3·75 0·5	do.	do.
20% Protein Antibiotic Vitamised Broiler Mash with Nicrazin	192	do.	do.	do.	do.	Bran, pollard, gristed grains, Wheat germ, meat meal, whale meal, dried solubles, oysterflour, riboflavin, procaine penicillin, vitamins A and D_3, bone flour, Christmas phos., lucerne, pollard, manganese sulphate, milk powder	18·0	2·5*	6·0	1·0 0·25	3·0 1·0	2·5 1·0	do.	do.
18% Protein Vitamised Cockerel Fattening Mash	193	do. ...	do.	do.	do.	Bran, pollard, gristed grains, wheat germ, whale meal, meat meal, blood meal, oyster flour, vitamins A and D_3, Christmas phos., manganese sulphate	18·0	2·0*	6·5	1·0 0·5	3·5 1·0	3·75 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton	
Chicken Grain	195	do.	do.	do.	do.	Wheat, maize, peas, shell grit	9·0	1·5*	4·5	....	....	....		
18% Antibiotic Vitamised Chick Crumbles	200	do. ...	do.	do.	do.	Bran, pollard, gristed grain, oyster, wheat germ, meat meal, whale meal, dried solubles, riboflavin, procaine penicillin, vitamins A and D_3, bone flour, Christmas phos., lucerne, pollard, manganese sulphate, milk powder	18·0	2·5*	6·0	1·0 0·25	3·0 1·0	2·5 1·0	Vitamin A 5,000,000 I.U./ton Vitamin D_3 1,500,000 I.U./ton	
18% Antibiotic Vitamised Chick Crumbles with Nefco	201	do.	do.	do.	do.	Bran, pollard, gristed grains, oyster, wheat germ, meat meal, whale meal, dried solubles, riboflavin, procaine penicillin, vitamins A and D_3, bone flour, Christmas phos., lucerne, pollard, manganese sulphate, milk powder, Nefco	18·0	2·5*	6·0	1·0 0·25	3·0 1·0	2·5 1·0	do.	do.
15% Protein Vitamised Growers' Pellets	202	do.	do.	do.	do.	Bran, pollard, gristed grains, wheat germ, meat meal, whale meal, dried solubles, oyster flour, vitamins A and D_3, riboflavin, Christmas phos., manganese sulphate	15·0	2·5*	6·0	1·0 0·5	3·5 1·0	3·75 0·5	do.	do.
20% Protein Antibiotic Vitamised Boiler Crumbles with Nicrazin	203	do.	do.	do.	do.	Bran, pollard, cereal meals, wheat germ, meat meal, whale meal, dried solubles, oyster flour, riboflavin, procaine penicillin, vitamins A and D_3, nicarbazine (nicrazin), Christmas phos., lucerne pollard, manganese sulphate, milk powder	20·0	2·5*	6·0	1·0 0·25	3·0 1·0	2·5 1·0	do.	do.
18% Protein Vitamised Cockerel Fattening Pellets	204	do.	do.	do.	do.	Bran, pollard, gristed grains, wheat germ, whale meal, oyster flour, vitamins A and D_3, Christmas phos., manganese sulphate, blood meal, meat meal	18·0	2·0*	6·5	1·0 0·5	3·5 1·0	3·75 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton	
Vitamised 16% Chick Starter	242	Richfoods	A. Richards & Co.			Bran, pollard, wheat meal, meat meal, buttermilk, yeast, oat meal, bone meal, vitamins A and D_3	16·0	5·0 3·0	7·0	1·0 *Nil*	3·0 1·0	3·0 0·8	Vitamin A 2,000 I.U./lb. Vitamin D_3 500 I.U./lb.	
15% Vitamised Growers Mash	245	do.	do.	do.	....	Bran, pollard, wheat meal, meat meal, whale meal, oat meal, bone meal, vitamins A and D_3	15·0	5·0 3·0	7·0	1·0 *Nil*	3·0 1·0	3·0 0·8	do.	do.
6.—*Turkey Foods.*														
Turkey Starter Mash A and D_3	107	Wesfarmers	Westralian Farmers Co-op. Ltd.			Bran, pollard, gristed oats, wheat, buttermilk, dried yeast, meat meal, bone meal, vitamins A and D_3	24·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	Vitamin A 4,000 I.U./lb. Vitamin D_3 600 I.U./lb.	

* Minimum.

Stock Food	Applic. No.	Brand	By whom registered	Materials from which made	Registered Analysis						
					Crude Protein	Crude Fat	Crude Fibre	Sodium Chloride ($NaCl$)	Phosphoric Acid (P_2O_5)	Calcium (Ca)	Percentages of other substances claimed to be of reputed Medicinal or Nutritive Value
B.—Compound Foods—*continued.*					% (Min.)	% (Max.) (Min.)	% (Max.)	% (Max.) (Min.)	% (Max.) (Min.)	% (Max.) (Min.)	%
6.—*Turkey Foods*—*continued.*											
20% Protein Turkey Growers Mash A and D_3	108	Wesfarmers	Westralian Farmers Co-op. Ltd.	Bran, pollard, gristed oats, wheat, buttermilk, dried yeast, meat meal, bone meal, vitamins A and D_3	20·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	Vitamin A 4,000 I.U./lb. Vitamin D_3 600 I.U./lb.
Turkey Starter Pellets A and D_3	118	do.	do. do. do.	do. do. do.	24·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	do. do.
Turkey Growers Pellets A and D_3	119	do.	do. do. do.	do. do. do.	20·0	5·0 3·0	7·0	1·0 *Nil*	2·0 1·0	2·0 1·0	do. do.
7.—*Pig Foods.*											
Pig Fattening Mash	14	do.	do. do. do.	Bran, pollard, wheat meal, oat meal, meat meal, bone meal, oyster flour	13·0	6·0 3·0	7·0	1·0 *Nil*	4·0 2·0	3·0 1·0	
Pig Fattening Pellets	15	Red Comb	do. do. do.	do. do. do.	13·0	6·0 3·0	7·0	1·0 *Nil*	4·0 2·0	3·0 1·0	
Pig Growers Mash	16	Wesfarmers	do. do. do.	Bran, pollard, wheat meal, barley meal, oat meal, meat meal, bone meal, oyster flour	16·0	6·0 3·0	7·0	1·0 *Nil*	4·0 2·0	1·0 *Nil*	
Pig Growers Pellets	17	Red Comb	do. do. do.	do. do. do.	16·0	6·0 3·0	7·0	1·0 *Nil*	4·0 2·0	3·0 1·0	
Pig Breeders Mash	18	Wesfarmers	do. do. do.	Bran, pollard, wheat meal, whale meal, ribon, meat meal, buttermilk, bone meal, oyster flour	18·0	6·0 3·0	7·0	1·0 *Nil*	4·0 2·0	3·0 1·0	
Pig Breeders Pellets	19	Red Comb	do. do. do.	do. do. do.	18·0	6·0 3·0	7·0	1·0 *Nil*	4·0 2·0	3·0 1·0	
Pig Weaners Mash ...	20	Wesfarmers	do. do. do.	Bran, pollard, wheat meal, whale meal, meat meal, buttermilk, brewers' yeast, bone meal	20·0	6·0 3·0	7·0	1·0 *Nil*	4·0 2·0	3·0 1·0	
Pig Weaners Pellets	21	Red Comb	do. do. do.	do. do. do.	20·0	6·0 3·0	7·0	1·0 *Nil*	4·0 2·0	3·0 1·0	
Pig Food	58	Eve-Lyn	Tropical Traders & Patersons Ltd.	Gristed wheat, barley, rye, pollard, salt, limestine, chalk, sulphate, animal charcoal, sulphate of iron, limonite, copper sulphate, medicinal herbs	5·0	1·0*	5·0	9·6 8·6	3·75 3·25	9·5 8·5	
Pig Mash (Fortified A and D_3)	146	Morlay	R. B. Young Products Pty. Ltd.	Wheat, pollard, oyster flour, rock phosphate, cereal meals, meat meal, apac, whale meal or solubles, limestone, minerals	14·0	3·0*	6·0	2·0 0·25	3·0 1·0	4·0 1·5	Vitamin A 3,300 I.U./lb. Vitamin D_3 330 I.U./lb.
18% Protein Antibiotic Vitamised Pig Starter	213	Thomas	W. Thomas & Co. (W.A.) Ltd.	Pollard, wheat germ, gristed grains, meat meal, whale meal, dried solubles, oyster flour, salt, riboflavin, procaine penicillin, Christmas phos., vitamins A and D_3, manganese sulphate, stabilised iodine, cobalt sulphate	18·0	2·5*	6·5	2·0 1·0	3·75 1·0	4·0 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton Manganese 60·0 ppm Cobalt 3·0 ppm Iodine 1·2 ppm
16% Protein Antibiotic Vitamised Pig Grower	214	do.	do. do. do.	do. do. do.	16·0	2·5*	6·5	2·0 1·0	3·5 1·0	4·5 1·0	do. do.
14% Protein Pig Fattening Mash	215	do.	do. do. do.	Pollard, gristed grains, dried solubles, salt, meat meal, oyster flour, manganese sulphate, stabilised iodine, cobalt sulphate, Christmas phos.	14·0	2·5*	6·0	2·0 1·0	3·75 1·0	4·0 1·0	Manganese 60·0 ppm Cobalt 3·0 ppm Iodine 1·2 ppm

18% Protein Antibiotic Vitamised Pig Starter Pellets	216	do.	do. do. do.	Pollard, gristed grains, meat meal, whale meal, dried solubles, oyster flour, salt, riboflavin, procaine penicillin, vitamins A and D_3, manganese sulphate, stabilised iodine, cobalt sulphate, Christmas phos.	18·0	2·5*	6·5	2·0 1·0	3·75 1·0	4·0 1·0	Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton Manganese 60·0 ppm Cobalt 3·0 ppm Iodine 1·2 ppm
16% Protein Antibiotic Vitamised Pig Grower Cubes	217	do.	do. do. do.	Stabilised iodine, Christmas p'.os., pollard, gristed grains, whale meal, meat meal, dried solubles, oyster flour, salt, procaine penicillin, stabilised vitamins A and D_3, manganese sulphate, cobalt sulphate	16·0	2·5*	6·5	2·0 1·0	3·5 1·0	4·5 1·0	do. do.
14% Protein Pig Fattening Cubes	218	do.	do. do. do.	Pollard, gristed grains, whale meal, salt, meat meal, dried solubles, oyster flour, manganese sulphate, stabilised iodine, cobalt sulphate, Christmas phos.	14·0	2·5*	6·5	2·0 1·0	3·75 1·0	4·0 1·0	Manganese 60·0 ppm Cobalt 3·0 ppm Iodine 1·2 ppm
8.—*Horse Foods.*										
Horse Food	55	Eve-Lyn	Tropical Traders & Patersons Ltd.	Pollard, barley, gristed wheat, whole linseed, salt, chalk, manganesium sulphate, sulphur, sulphate iron, copper sulphate, sodium bicarbonate, medicinal herbs	8·5	3·0 2·0	7·0	5·0 4·5	1·0 0·5	1·75 0·75	Sulphur 1·25
12% Protein Sweet Horse Food	222	Thomas	W. Thomas & Co. (W.A.) Ltd.	Mill offal, grain meals, molasses, malt combings, oyster flour, salt, manganese sulphate, stabilised iodine, cobalt sulphate, Christmas phos.	12·0	1·5*	10·0	2·0 1·0	2·5 1·0	4·0 1·0	Manganese 60·0 ppm Cobalt 3·0 ppm Iodine 1·2 ppm
9.—*Dog Foods.*										
Dog Candy Munchies	37	K9	Zest Manufacturing Co. Ltd.	Yeast, liver meal, meat meal, cod liver oil, cheese, fish, salt, bone meal, wheat, dried eggs, wheat germ	23·0	7·0 6·0	2·0	4·0			
Dog Biscuits (Kibbletts)	38	do.	do. do. do.	Yeast, fish, cheese, charcoal, liver, vegetable with chlorophyll	15·0	3·5 2·0	2·0	2·0			
Dog Biscuits	39	do.	do. do. do.	Meat liver, fish, cheese, bone meal, vegetables, salt, charcoal	15·0	3·5 2·0	2·0	2·0			
Dog Biscuits (Fives)	40	do.	do. do. do.	Meat, liver, fish, cheese, vegetables, charcoal, chlorophyll	15·0	3·5 2·0	2·0 2·0	2·0			
Dog & Cat Food	91	Tucker Box	Tucker Box Dog & Cat Food Co.	Meat and meat by-products, cereals, salt, vegetables	10·0	5·0 2·5	0·5	1·0			
Dog Meal AB, A and D_3	126	Wesfarmers	Westralian Farmers Co-op. Ltd.	Bran, pollard, meat meal, dried yeast, salt, buttermilk, bone meal, antibiotics, vitamins A and D_3	20·0	8·0 4·0	5·0	2·0 1·0	2·5 1·0	3·0 1·0	Vitamin A 4,000 I.U./lb. Vitamin D_3 450 I.U./lb.
Dog Pellets AB, A and D_3	127	do.	do. do. do.	do. do. do.	20·0	8·0 4·0	5·0	2·0 1·0	2·5 1·0	3·0 1·0	do. do.
Charcoal Shapes	151	Snaps	Snaps Dog Foods	Whole meal flour, wheat germ, bone flour, meat meals, whale meal and solubles, milk powder, molasses, iodised salt, vitamins A and D_3, pulverised charcoal	20·0	2·5 2·0	6·0	0·6 0·5	2·5 2·0	3·0 2·5	
Puppy Meal	152	do.	do. do.	do. do. do.	20·0	5·5 5·0	1·5	0·6 0·5	2·5 2·0	3·0 2·5	
Plain Shapes	153	do.	do. do.	do. do. do.	20·0	2·5 2·0	1·5	0·6 0·5	2·5 2·0	3·0 2·5	
No. 1 Dog Biscuits	154	do.	do. do.	do. do. do.	20·0	2·5 2·0	1·5	0·6 0·5	2·5 2·0	3·0 2·5	
Dog and Cat Food	155	Pets	Gollin & Co. Ltd.	Meat, rabbit, wheat, fish	10·0	7·0 4·0	1·0	0·4			
Dog Food	156	do.	do. do.	do. do.	10·0	7·0 4·0	1·0	0·4			

* Minimum.

Stock Food	Applic. No.	Brand	By whom registered	Materials from which made	Registered Analysis: Crude Protein	Crude Fat	Crude Fibre	Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Calcium (Ca)	Percentages of other substances claimed to be of reputed Medicinal or Nutritive Value
					% (Min.)	% (Max.) (Min.)	% (Max.)	% (Max.) (Min.)	% (Max.) (Min.)	% (Max.) (Min.)	%
B.—Compound Foods —*continued.* 9.—*Dog Foods—ctd.*											
20% Protein Kanine Kibbles	223	Thomas	W. Thomas & Co. (W.A.) Ltd.	Milk powder, molasses, oyster flour, predigested cereal meals, wheat germ, grain meals, meat meal, bone flour, salt, potassium iodide, vitamins A and D_3 and B_1	20·0	1·0	2·5	1·5 0·5	2·5 0·5	2·5 0·5	Vitamin A 6,000,000 I.U./ton Vitamin D_3 1,800,000 I.U./ton
Dog Food	231	Jonah	Hunts Canning Co. Pty. Ltd.	Crushed wheat, whale meat	20·0	9·0 6·5	0·5				
Kibbled Dog Meal	232	Farrell's	E. M. Farrell & Sons	Wheat meal, salt, meat meal, bone meal	10·0	2·0 1·0	2·5	1·0			
C.—Stocklicks. 1.—*Bone Meals.*											
Bone Meal	27	Ancho	Anchorage Butchers Pty. Ltd.	Waste meat products	23·63	2·44	Trace	Trace	26·76*	...	Lime (CaO) 26·95*
Sterilised Bone Flour	30	Tricalos	Davis Gelatine (Aust.) Pty.	Bones	5·0	....	....	....	30·0*	....	Lime (CaO) 40·0*
Sterilised Bone Grit	31	do.	do. do. do.	do.	5·0	....	....	....	30·0*	....	do. do.
Whale Bonemeal	43	Wrights	Wrights Ltd.	Whale bone	8·5	....	....	1·0	27·0*	28·0*	
Bone Meal	48	Watsonia	Watson's Food Pty. Ltd.	Abattoir offal and bone	14·0	..	..	..	26·5*	....	Lime (CaO) 36·0*
Do.	88	W.A.M.E.	West Australian Meat Export	Selected bones solely	18·75	..	..	0·25	24·0*	....	Lime (CaO) 27·0*
Sterilised Bone Flour	228	Thomas	W. Thomas & Co. (W.A.) Ltd.	Whale bones	....	....	1·0	....	24·0*	....	Lime (CaO) 32·0*
2.—*Oyster Flours.*											
Oyster Flour	171	Dean's	J. Dean & Son	Shell	....	.	.	0·5	Trace	....	Lime (CaO) 42·0*
Do.	225	Thomas	W. Thomas & Co. (W.A.) Ltd.	Oyster shell	....	....	....	1·0	*Nil*	....	do. do.

Stock Food	Applic. No.	Brand	By whom Registered	Materials from which Made	Registered Analysis: Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Lime (CaO)	Magnesia (MgO)	Iron (Fe)	Sulphur (S)	Iodine (I)	Copper (Cu)	Cobalt (Co)	Manganese (Mn)	Potassium (K)	Zinc (Zn)	Other
					% (Max.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	
3.—*Mixed Stock Licks.*																	
Denmark Cobalt Lick	34	C.S.M.L.	Cuming Smith Mt. Lyell F.F. Ltd.	Limonite, sulphate copper, salt	38·0	....	....	....	20·0	....	....	0·14	20 ppm				
Super Mindif	35	Boots	Boots Pure Drug Co.	Calcium, phosphorous, copper, cobalt, manganese, iodine, sulphur, iron, sodium chloride	30·0	11·4	....	....	0·24	0·75	240 ppm	1,800 ppm	300 ppm	510 ppm	....	....	Calcium (Ca) 17·4%

Mindif Salt Lick	36	do.	do. do.	Calcium, phosphorus, copper, cobalt, manganese, iodine, iron, sodium, chloride	90·0	0·65	....	....	0·35	....	850 ppm	3,000 ppm	300 ppm	170 ppm	....	....	Calcium (Ca) 3·4%
Minerals	60	Blue-Peter	Agricultural Products Co.	Ground phosphate rock, ground limestone, limonite, sulphate of minerals and borax	10·0	5·0	20·0	1,200 ppm	4·0	...	....	5,000 ppm	550 ppm	1,000 ppm	....	500 ppm	Boron (B) 200 ppm
Medicated Salt Block "B"	61	do.	do. do.	Salt, ground limestone, limonite, sulphates of minerals	70·0	....	6·0	....	1·5	....	..	550 ppm	95 ppm	200 ppm			
Medicated Calcium	62	do.	do. do.	Ground limestone, limonite, sulphates of minerals	1·0	..	45·0	....	3·5	.	..	1,500 ppm	285 ppm	600 ppm			
Mineral Supplement for Cows	71	Hyco	Goldsbrough Mort & Co. Ltd.	Potassium chloride, magnesium oxide, zinc sulphate, copper sulphate, manganese sulphate, sodium molybdate, sodium borate, potassium, iodide, iron sulphate, cobalt chloride	..	4·0	.	1,500 ppm	750 ppm	.	200 ppm	2,500 ppm	250 ppm	1,500 ppm	..	1,500 ppm	(KCL) 10% (N) 6% (Mo)100ppm (B) 50 ppm
Mineral Supplement for Sheep and Cattle	72	Hytel	do. do.	do. do. do.		..	..	4·0	0·5		0·05	12·0	0·5	7·5		8·0	(KCL) 20% (B) Trace (Mo) Trace
Concentrated Cattle Lick	74	Vita Lick	do. do.	Bone flour, bone charcoal, sodium sulphate, flowers of sulphur, limonite, potassium iodide, copper sulphate, cobalt chloride	..	28·2	36·1	.	3·5	0·45	0·034	0·2	0·014	.	..	..	Sodium Sulphate 3%
Concentrated "D" (Cobaltised and Copperised)	75	do.	do. do.	Bone flour, bone charcoal, limonite, potassium iodide, cobalt chloride, copper sulphate, flowers of sulphur, sodium sulphate	.	30·0	38·75	...	1·25	2·0	0·034	0·2	0·014	.	.		Sodium Sulphate1·8%
Mineral Supplement for Pigs	76	Por-co-vite	do. do.	Bone flour, bone charcoal, sodium sulphate, flowers of sulphur, salt, limonite, calcium carbonate, copper sulphate, cobalt chloride, potassium iodide	14·0	19·14	29·32	..	0·62	9·6	0·052	0·1	0·003	..	...	..	Sodium Sulphate 2·6%
Concentrated "Calcon" (Cobaltised and Copperised)	77	Vita-Lick	do. do.	Bone flour, calcium carbonate, limonite, powdered sulphur, sodium sulphate, potassium iodide, cobalt chloride, copper sulphate	.		11·75	46·0	.	1·9	2·0	0·034	0·2	.	.	.	Sodium Sulphate 1·75%
Chic-a-vite	78	Vita Lick	do. do.	Bone flour, bone charcoal, ferrous sulphate, flowers of sulphur, sodium sulphate, cod liver oil, gentian, potassium iodide, meal derived from rice, by-products		20·2	25·9	..	1·7	1·7	.						Sodium Sulphate 6% 16 oz. Potassium iodide to the ton
Mineral Food Supplement for Poultry	95	Watkins	The J. R. Watkins Co.	Green manganous oxide, calcium carbonate, magnesium carbonate, dicalcic phosphate, bone char, ferric oxide, salt, ferrous sulphate, magnesium sulphate, ground sulphur, mineral oil, cobalt, sulphate, copper, zinc, potassium iodide	10·5	15·0	33·8	0·5	1·1	2·4	0·0153	0·0129	0·01	0·25		0·01	
Mineral Food Supplement for Stock	96	do.	do. do.	Dicalcic phosphate, rock phosphate, calcium carbonate, ferric oxide, ferrous sulphate, magnesium sulphate, ground sulphur, salt, iodine, copper, manganese, cobalt, zinc	9·0	15·5	32·0	0·7	1·1	1·8	0·0176	0·0129	0·01	0·009		0·011	

* Minimum.

Stock Food	Applic. No.	Brand	By whom Registered	Materials from which Made	Registered Analysis: Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Lime (CaO)	Magnesia (MgO)	Iron (Fe)	Sulphur (S)	Iodine (I)	Copper (Cu)	Cobalt (Co)	Manganese (Mn)	Potassium (K)	Zinc (Zn)	Other
C.—Stocklicks—*ctd.*																	
3.—*Mixed Stock Licks—continued.*																	
					% (Max.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	
Sheep Lick	128	Wesfarmers	Westralian Farmers Co-op. Ltd.	Bone meal, common salt, yeast, iron sulphate, copper sulphate, cobalt, chloride, manganese sulphate, potassium iodide, sulphur, zinc, sulphate	80·0	1·0	5·0	....	1·2	3·3	150 ppm	220 ppm	92 ppm	200 ppm	50 ppm	80 ppm	
Cattle Lick	129	do.	do. do.	do. do. do.	80·0	1·0	5·0	....	1·2	3·3	153 ppm	220 ppm	92 ppm	200 ppm	50 ppm	80 ppm	
"G" Concentrated Sheep Lick	130	Vic-Lic	Wilcox Mofflin Ltd.	Bone char, iron, limonite, copper, carbonate, cobalt, chloride, potassium iodide	1·0	28·0	37·0	....	5·8	....	....	0·75	0·031	....	....	....	16 oz. Potassium Iodide to the ton
"D" Concentrated Sheep Lick	131	do.	do. do.	Bone char, iron, limonite, sodium sulphate, copper carbonate, cobalt, chloride potassium iodide	1·0	29·0	38·0	....	2·9	....	....	0·75	0·031				
Concentrated Cattle Lick	132	do.	do. do.	Bone char, iron, limonite, salt, potassium iodide	5·5	27·0	36·0	....	2·9	....	....	....	....	....	....	....	16 oz. Potassium Iodide to the ton
Mineralised Salt Block	133	do.	do. do.	Salt, pulverised limestone, iron limonite, epsom salts, molasses, bone char, potassium iodide	53·0	4·5	19·5	0·16	1·25	...	....	....	....	....	....	....	Molasses 3%
Mineralised Supplement for Stock	134	Rawleigh's	The W. T. Rawleigh Co. Ltd.	Salt, sulphur, copperas, sodium phosphate, potassium iodide, calcium carbonate, cobalt sulphate, defluorinated phosphate, mineral oil, molasses and drug mixture	15·0	12·24	27·0	....	1,000 ppm	3·5	220 ppm	....	10 ppm	....	80 ppm	....	Calcium (Ca) 13·42 (Na) 70 ppm
Poultry Powder Iodized	135	do.	do. do.	Oyster shell, sulphur, potassium iodide, copperas, iodine sulphate, ground bone, manganese sulphate, cobalt, sulphate, zinc sulphate, quassia, defluorinated phosphate, mineral oil	....	16·5	38·7	....	400 ppm	4·0	100 ppm	40 ppm	100 ppm	120 ppm	40 ppm	100 ppm	
Rock Salt....	149	Elders	Elder Smith & Co. Ltd.	Sodium chloride, marl	95·0												
Iodised Mineral Lick	158	Dayson and Hewitt	Boans Ltd.	Limestone flour, bone meal, salt, iron sulphate, ferric oxide, sulphur, potassium iodide, copper sulphate, cobalt sulphate	83·7	1·72	5·25	....	0·71	0·49	0·03	0·06	0·004	....	0·01		
Poultry Spice	159	do.	do. do.	Wheat, offals, spices, mineral salts	1·0	....	....	....	2·1	1·2	38 ppm	128 ppm	21 ppm	1,720 ppm	....	....	Calcium (Ca) 10·0
Aquamin Concentrate	160	K.C.C.	Kwinana Chemical	Superphosphate, phosphoric acid, copper ore, cobalt sulphate	....	31·0	3·0	....	Trace	....	....	0·6	0·1	Trace	Trace	Trace	
Complete Mineral Supplement for Stock (Pigs)	162	Nutro-Min	Nutritional Products Pty. Ltd.	Eggshell, meal, bone flour, salt, iron sulphate, copper, cobalt, potassium iodide, manganese, zinc sulphate	18·5	9·1	37·1	..	0·35	....	10 ppm	150 ppm	50 ppm	50 ppm	....	120 ppm	

Complete Mineral Supplement(Cattle Sheep, Horses, Goats)	163	do.	do. do.	Eggshell, meal, bone flour, salt, iron sulphate, potassium iodide, copper, cobalt, manganese sulphate	26·2	16·4	30·6	....	0·35	..	80 ppm	600 ppm	100 ppm	170 ppm	....	500 ppm	
Complete Mineral Trace Element & Vitamin Supplement for Stock (Pigs)	164	Nutro-Vitramin	do. do.	Eggshell meal, bone flour, molasses, salt, iron sulphate, potassium iodide, vitamins A and D_3, niacin, copper, cobalt, manganese, zinc sulphate	18·5	9·1	37·1	....	0·35	....	10 ppm	150 ppm	50 ppm	50 ppm	....	120 ppm	Vitamin A 105,000 I.U./lb. Vitamin D_3 10,500 I.U./lb. Niacin 87mg./lb.
Complete Mineral & Vitamin Supplement	165	do. ...	do. do.	do. do. minus niacin	26·2	16·4	29·7	....	0·35	....	80 ppm	600 ppm	100 ppm	170 ppm	....	500 ppm	Vitamin A 180,000 I.U./lb. Vitamin D_3 18,000 I.U./lb.
DC (New)....	172	Bio	The Biological Institute of A/Asia Pty. Ltd.	Iron glycerophosphate, copper chloride, cobalt chloride, calcium glycerophosphate, ammonium molybdate, commercial hydrochloric acid, water	..	2·95	1·74	....	0·37	....	....	0·085	0·014	....	....	....	Molybdenum (Mo) 0·03
Mineral and Vitamin Powder for Pigs	173	do.	do. do.	Copper sulphate, cobalt sulphate, potassium nitrate, oil of Aniseed, Foenugreek, alstonia powder, limonite, calcium carbonate, potassium iodide, liver meal, vitamins A and D_3, bone flour, riboflavin	....	5·6	22·25	....	3·2	....	0·037	0·026	0·026	....	....	....	Nitrate 13·4% Vitamin A 44,500 I.U./lb. Vitamin D_3 4,450 I.U./lb. Riboflavin 33mg./lb.
Ovatine for Fowls	174	Bio	The Biological Institute of A/Asia. Pty. Ltd.	Astonia bark, ginger, foenugreek, ferrous sulphate, magnesium sulphate, potassium iodide, manganese sulphate, copper sulphate, cobalt chloride	....	....	....	7·30	5·87	....	0·05	0·41	0·03	2·19			
Vigomin	175	do. ...	do. do.	Malt flour, buttermilk powder, salt, liver meal, charcoal, vitamins A and D_3, sulphur, ferrous sulphate, bone flour	1·25	30·0	25·0	....	0·75	1·90	....	....	....	....	....	....	Crude Protein 5·6% Vitamin A 250,000 I.U./lb. Vitamin D_3 25,000 I.U./lb.
Stock Conditioner	176	Luffs Blue Label	Stam Products	Yeast, maize oil meal, caramel, oil of aniseed, boric acid, thiamine hydrochloride, salts of iron, zinc, copper, manganese, cobalt	....	...	....	....	16·46 ppm	....	....	53·3 ppm	49·6 ppm	50·7 ppm	....	56·4 ppm	Vitamin B1 27·700 I.U./lb.
Phosphate Nuts and Cobalt	226	Thomas	W. Thomas & Co. (W.A.) Ltd.	Pollard, Christmas phos., sodium chloride, molasses, cobalt	10·0	9·0	11·0	....	....	....	....	....	50 ppm				
Cobalt Sheep Lick	227	do.	do. do.	Christmas phos., stock salt, cobalt sulphate or chloride	66·6	12·2	14·9	....	....	..	....	....	120 ppm				
Phosphate Feeding Supplement	229	Christmas Phos.	do. do.	Precipitated phosphate dust	36·6	44·8											
Sheep Lick	234	Ovex	Tuit & Co.	Salt, rock phosphate, cobalt chloride, copper sulphate, iron oxide, zinc oxide	60·0	4·0	10·0	....	0·78	0·1	....	0·06	0·075	0·06	....	0·2	
Cattle Lick	235	Bovex	do.	Salt, rock phosphate, cobalt chloride, copper sulphate, manganese sulphate, iron oxide, zinc oxide	75·0	4·0	10·0	....	0·78	0·06	....	0·06	0·01	0·05	....	0·16	

Stock Food	Applic. No.	Brand	By whom Registered	Materials from which Made	Registered Analysis: Sodium Chloride (NaCl)	Phosphoric Acid (P_2O_5)	Lime (CaO)	Magnesia (MgO)	Iron (Fe)	Sulphur (S)	Iodine (I)	Copper (Cu)	Cobalt (Co)	Manganese (Mn)	Potassium (K)	Zinc (Zn)	Other
C.—Stock Licks—*continued.* 3.—*Mixed Stock Licks—continued.*					% (Max.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	% (Min.)	
Cattle Lick	239	David Grays	David Gray & Co. Ltd.	Sodium chloride, iron sulphate, copper sulphate, cobalt chloride, manganese sulphate, potassium chloride, bone meal, yeast	80·0	1·0	5·0	.	1·2	3·3	150 ppm	220 ppm	92 ppm	200 ppm	50 ppm	80 ppm	
Sheep Lick	240	do.	do. do.	do. do. do.	80·0	1·0	5·0	....	1·2	3·3	150 ppm	220 ppm	92 ppm	200 ppm	50 ppm	80 ppm	Riboflavin 130 mg./lb.
Black Band .	249	Min-a-vit	Hamilcar Holdings Pty. Ltd.	Bone flour, calcium carbonate, manganese sulphate, iron oxide, potassium iodide, sodium chloride, cobalt sulphate, copper sulphate, vitamin D_3	15·0	27·0	40·0	.	0·07		0·03	0·0025	0·002	0·42	.	....	Vitamin D_3 6,000 I.U./lb.
Orange Band ...	250	do.	do. do.	Bone dust, talc, whiting, salt, molasses, copper sulphate, zinc sulphate, manganese sulphate, cobalt sulphate, potassium iodide, vitamin D_3	21·0	18·0	22·0	2·0	....	...	0·043	0·25	0·009	0·032	...	0·022	
Red Band	251	do.	do. do.	Bone dust, talc, whiting, salt, molasses, copper sulphate, zinc sulphate, manganese sulphate, cobalt sulphate, iron oxide	16·0	12·0	18·0	6·0	0·625	....	0·043	0·025	0·009	0·032	....	0·022	
Black Band Plus Pack	252	do.	do. do.	Bone flour, calcium carbonate, manganese sulphate, iron oxide, potassium iodide, sodium chloride, cobalt sulphate, copper sulphate, vitamins A and D_3	15·0	27·0	40·0	...	0·077	....	0·030	·0025	·0025	·0020	0·42	...	Riboflavin 130 mg./lb. Vitamin D_3 6,000 I.U./oz. Vitamin A 675 I.U./gram
Sheep Pack ...	253	do. .	do. do.	Bone dust, talc, whiting, molasses, copper sulphate, zinc sulphate, manganese sulphate, cobalt sulphate, Potassium iodide, vitamin D_3	....	21·73	26·04	3·36	....	....	0·042	0·076	0·034	0·030	.	0·020	Vitamin D_3 320 I.U./gram
Sheep Plus Pack	254	do.	do. do.	do. do. do. plus vitamin A	....	21·73	26·04	3·36	....	....	0·042	0·076	0·034	0·030	. .	0·020	Vitamin A 475 I.U./gram Vitamin D_3 320 I.U./gram

Fig. 1.—Flax in the stacks

FLAX VARIETY EXPERIMENTS AT BRAMLEY AND MANJIMUP 1955-57

By H. G. ELLIOTT, Assistant Superintendent of Dairying and
F. E. RYAN, Agrostologist

EARLY in 1955 it was decided to conduct flax variety trials in the higher rainfall areas of this State to determine what yields of straw and what percentage of fibre could be obtained. The first trial was conducted at Bramley Research Station and was continued for three years—the second of the series was conducted at Manjimup commencing in 1956 and continued in 1957. Details of these experiments are given below.

BRAMLEY RESEARCH STATION 1955-57

These experiments were conducted in 1955, 1956, and 1957, for the purpose of investigating various flax varieties with regard to their suitability for the district, growth, yield of straw, and subsequent fibre yield and quality.

Each year during the experiments, fields were selected which had previously carried a clover-grass pasture for a considerable period.

The land was prepared by ploughing with a mouldboard plough left for two to three weeks and then cultivated with disc cultivators and harrows. In 1955 and 1956 good clean seed beds were obtained but in 1957 rain hampered good soil preparation.

All planting was carried out by a disc drill and the seed and fertiliser covered by brush harrows. Fertilisers consisted of 120 lb. of super-zinc mixture with 56 lb. of muriate of potash per acre, drilled in with the seed.

AIR-DRIED STRAW YIELDS IN CWTS. TO THE ACRE.

Variety	1955	1956	1957	Mean
Liral Crown 70 lb./acre*	53·35	37·6	....	45·5
Concurrent 70 lb./acre....	49·75	26·6	28·1	34·8
Boyup 70 lb./acre	44·50	41·2	27·9	37·9
Weira 70 lb./acre	....	30·7	22·4	26·5
Wada 100 lb./acre†	19·3	29·9	26·9	25·3 (28·4)
Wada 70 lb./acre†	18·87	28·8	26·5	24·7 (27·6)
General Mean	37·16	32·4	26·4	32·5
L.S.D. at 1%	23·75	....	....	.. ..
L.S.D. at 5%	16·92	9·2	N.S.	.. ..

* Liral Crown is not a variety which is grown commercially in this State owing to its high incident of Rust.
† Seed germination very low in 1955.

The following table gives the rainfall figures for the district for the three years of the experiments.

RAINFALL FIGURES (BRAMLEY).

Month	1955	1956	1957	Average (Years)
January	129	2	16	40
February	112	14	25	53
March	16	267	214	98
April	437	181	376	269
May	507	1,403	755	376
June	866	1,052	1,372	1,001
July	887	921	564	906
August	1,289	297	713	674
September	440	289	307	393
October	596	191	222	307
November	110	167	23	170
December	87	336	31	61
Total	5,426	5,120	4,618	4,298
May-November	4,045	4,320	3,987	3,838
September-November	1,150	647	552	870

The effect of the dry month of November of the last year (1957) is indicated by the lower average yield obtained per acre. In 1955, with 1,146 points, 1956, with 647 points of rain and 1957 with 552 points as against an average of 870 points during the vital months, September to November, shows that both 1956 and 1957 were under average. Good spring rains, particularly in the month of November are essential for obtaining high yields from this crop.

The results of the three years of this trial indicates that of the commercially available varieties in this State "Concurrent" and "Boyup" have given consistently good yields.

Flax is a crop which requires a clean, weed-free seedbed as in the early stages of growth it is not a good competitor—it is very readily attacked by both the red-legged earthmite and lucerne flea. Consequently, good clean cultivation, together with the use of a suitable insecticide sprayed on prior to, or just after, planting is essential to prevent loss or damage to the young seedlings. The present normal method of planting is semi-broadcasting with a drill.

It is of interest to note that the average yield of straw at Boyup Brook is about 6 cwts. less than that obtained from all the varieties over the three years grown at Bramley, but as a general rule the costs of preparing the seed bed, harvesting, cartage, etc., would be less per acre at Boyup Brook. It must be noted also that there are many farmers in the Boyup Brook area who obtain high yields from big acreages consistently every year.

Details of the results from the straw after processing at the flax mill for the 1957 crop were as follows:—

YIELDS FROM PROCESSED STRAW (BRAMLEY).

Variety	Yields of Straw in Cwts./ac.	Yield in Lb. per Acre and Percentage Recovery					
		Seed and Chaff		Line Fibre		Tow	
		lb.	%	lb.	%	lb.	%
Concurrent 85 lb./ac.	28·1	555	17·6	439	13·9	136	4·3
Boyup— 85 lb./ac.	27·9	514	16·3	345	11·4	148	4·7
Wada— 100 lb./ac....	26·9	491	16·3	359	11·9	125	4·1
Wada— 85 lb./ac.	26·5	534	18·0	344	11·6	114	3·8
Weira— 85 lb./ac.	22·4	456	18·2	322	12·9	70	2·8
Mean	26·4	....	....	363	12·3	....	....
Standard Error	3·33	....	....	0·454	0·401	....	....
Per cent. of G.M.	8·0	....	....	8·8	3·3	....	....
L.S.D.—							
P. ∠ ·05 ..	N.S.	..	....	N.S.	1·24	....	....
P. ∠ ·01	....	....	....	....	1·73	....	....

From the above it will be seen that the variety Concurrent sown at 85 lb. seed per acre gave, apart from the highest yield of straw per acre, the highest line fibre recovery of 13.9 per cent.

For the flax mill to operate successfully and profitably it requires weed free relatively fine undamaged straw of high quality of 33 in. to 36 in. in length, which would be capable of giving a high percentage extraction of good quality fibre.

Good quality straw from high-yielding crops is always payable for the farmer to grow where he can contract with a processing mill to purchase the crop.

MANJIMUP, 1956 AND 1957

In 1956 it was decided to carry out some flax variety trials in the Manjimup area for the purpose of investigating their suitability for the district, also to obtain yields per acre and to determine whether the straw harvested was capable of high fibre yields with good quality.

In 1956 the experiment was conducted on the property of Mr. C. Horne, and in 1957 on the property of Mr. C. Lefroy of Manjimup.

The following table gives the rainfall data for the area for the two years.

Fig. 2.—Inspecting flax varieties in test rows

RAINFALL FIGURES (MANJIMUP).

Month	1956	1957	Average
January	0	9	81
February	22	21	81
March	281	149	125
April	246	337	224
May	1,059	530	595
June	781	1,302	724
July	647	344	707
August	229	611	641
September	277	297	487
October	242	182	351
November	166	10	160
December	207	53	90
Total	4,157	3,845	4,266
Growing Period—May-November	3,401	3,276	3,665
Vital Period—September-November	685	489	998

From this table it will be seen that the rainfall for the periods May-November and September-November were under average for the two years of this experiment.

C. Horne, Middlesex, Manjimup—1956. This flax variety trial was disc drilled in on May 26, according to the plan which consisted of four blocks, each of five treatments.

The site was on a slight hill slope with a northerly aspect. This area originally carried a jarrah, karri and redgum association and consisted of a red gravelly loam which had been cleared for many years. The area prior to planting to oats in 1955 had carried a dense stand of subterranean clover for many seasons.

The area was disc-ploughed at the end of April and later cultivated both ways with disc cultivators—then harrowed twice. Just prior to sowing it was again disc-cultivated and lightly harrowed making a good clean seed bed.

Seed was drilled in at the specified rates according to the plan together with 120 lb. zinc-super and 56 lb. muriate of potash per acre.

On July 17 (six weeks after germination) counts were taken to determine the plant numbers per running foot with the following results:—

Variety	Rate of Seeding (Lb. per acre)	(No. of Plants) Treatment means per Running Foot
Wada	85	43·0
Boyup	85	49·9
Concurrent	85	43·4
Liral Crown	85	74·5
Weira	85	55·5
Wada	100	57·1
Mean	....	54·7
L.S.D. at 1%	....	15·1
L.S.D. at 5%	....	10·9
Variation Coeff. = 9·4%		

The flax on all plots was pulled on December 7 and finally weighed at the mill one week later. The results of yields of straw are given in the following table.

AIR-DRIED STRAW YIELDS IN CWTS. TO THE ACRE

Variety	Rate of Seeding	Yield (cwt. per acre)
Boyup	85	50·6
Wada	100	49·6
Liral Crown	85	48·9
Weira	85	47·7
Wada	85	47·1
Concurrent	85	39·1
General Mean	....	47·1

C. Lefroy, Manjimup—1957. The experiment was located on a well-drained, gravelly, red-brown karri loam which had originally carried a stand of jarrah, karri and redgum. It was cleared 28 years ago and has been kept under sub-clover and annual grass pasture.

The paddock was tandem disced three times early in June, then ploughed 4 in. to 5 in. deep in mid-June. It was then spike-harrowed six times followed by a light disc harrowing prior to sowing. This was carried out on July 2. All varieties were planted at the rate of 100 lb. per acre per medium of an 11-row disc drill. The area was spike-harrowed following drilling.

Fertiliser consisted of 2 cwts. per acre of muriate of potash which was applied by drill at the same time as the seed was sown.

The average number of plants per square foot as at September 24 was as follows:—

Boyup—147.
Wada—160.
Concurrent—139.
Weira—140.

All varieties showed odd rust pustules and no insect pests were present. There was a considerable amount of dock and capeweed present and the docks were pulled out by hand and the straw was pulled by hand on December 1.

RESULTS

Details of the results are given in the following table:—

YIELDS FROM PROCESSED STRAW
MANJIMUP

Variety	Yields of Straw in Cwts./ac.	Yield in Lb. per Acre and Percentage Recovery					
		Seed and Chaff		Line Fibre		Tow	
		lb.	%	lb.	%	lb.	%
Concurrent	54·9	1,009	16·4	1,117	19·1	114	1·8
Boyup	50·2	898	15·9	947	17·2	122	2·1
Weira	49·4	962	17·4	1,008	18·2	69	1·2
Wada	54·9	918	14·9	921	16·8	122	2·2
Mean	50·8	947	16·7	1,013	17·8	106	1·87
S/E of G.M.....							
L.S.D.	N.S.	....	....	125·2	1·13		
	N.S.	....	....	180·0	1·63		
	N.S.	....	....	264·8	2·39		

For the two years which this variety trial has been in progress the following table gives the mean straw yield of each variety.

Variety.	Mean Yield in Cwts. per Acre. 1956 and 1957.
Boyup	50.4
*Liral Crown	48.9
Wada	48.5
Weira	48.5
Concurrent	47.0
General Mean	48.6

*1st year only—not a commercially sown variety in this State.

From the above table it will be seen that the average for all varieties show that they produced equally well and unless some other factor occurs such as rust, any of the four standard varieties grown in this State can be used in this area.

DISCUSSION

At present fibre flax is grown commercially only in the Boyup Brook district. The experimental results have been compared with commercial practice at Boyup. It must be noted, therefore, that some growers in the Boyup Brook area produce yields much higher than the average for the district and comparison of experimental results from one or two sites with a district average is not strictly valid. However, the results have been very encouraging from the following points of view.

1. Yield of Straw.

At Bramley mean yields of original straw averaged 32.5 cwts. per acre for the three years 1955, 1956, and 1957, in spite of adverse seasonal conditions in 1956 and especially in 1957. The standard varieties Boyup and Concurrent average 37.9 and 34.8 cwts. per acre for the three years but in the good year 1955 yields were 44.5 and 49.75 cwts. per acre respectively. These yields are higher than the average at Boyup Brook. At Manjimup average yields for 1956 and 1957 seasons were superior to either Bramley or Boyup Brook, with a mean yield of 48.6 cwts. per acre for the two years.

2. Recovery of Fibre.

The percentage recovery and quality of line fibre is an important consideration since it has a great influence on processing costs. The recovery of fibre at Boyup Brook in 1957 from the 1956 crop was calculated at 11.0 per cent., Bramley fibre

recovery was 12.3 per cent. and Manjimup 17.8 per cent. The results at Manjimup are thus very good.

3. Quality and Gross Value of Product.

The value of fibre, tow, seed, and chaff for each variety and district has been determined. The great difference in value between Manjimup and Bramley is obvious. This is related to yield per acre of straw but also quality of fibre produced at Manjimup was high.

4. Varieties.

The standard varieties Concurrent, Boyup, Wada and Weira were used in these trials. Concurrent and Boyup were consistent producers at Bramley and all four varieties produced equally well at Manjimup.

5. Other Considerations.

If flax growing is to extend into the Manjimup and Bramley areas, and providing mill contracts can be obtained, further information on cultivation in these areas is desirable. At Manjimup in 1956 the crop was sown last week in May to yield an average of 47.1 cwts. per acre. In 1957 the crop was sown on 17th of July for a yield of 48.6 cwts. per acre, and the 1957 was adverse with very poor spring conditions. Time of planting studies are needed.

Rate of sowing and method of sowing trials were conducted at Boyup in 1957. Semi-broadcasting with a drill was superior to drilling and a higher rate of seeding up to 105 lb. per acre has proved superior to the standard rate of 72 lb. These are being tried at Manjimup.

There is evidence at Boyup of a response to potash. Potash has been used in variety trials at both Bramley and Manjimup, but as yet no studies have been made on rates of application of this fertiliser.

Conclusion.

Both Bramley and Manjimup districts have shown that they are suitable for growing flax for fibre but best results to date have been obtained at Manjimup.

ACKNOWLEDGMENTS

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TRACTOR SAFETY

THE following terse hints on tractor safety have been prepared by the National Safety Council of Australia following upon a marked increase in the number of farm accidents. Statistics of farm accidents are not separately recorded in Australia, but figures from Britain and the U.S.A. indicate that a large percentage of the fatalities which have occurred on farms are due to lack of care in operating machinery.

General Precautions.

Read and act on maker's operating instructions.

Wear close-fitting clothes, avoid scarves or flapping garments.

Keep in place shield and safety guards provided by the makers.

Only operators should ride on the tractor.

Don't carry "joyriders" — especially children.

Keep children away from machines.

Do not continue to operate a tractor while sitting in an awkward or uncomfortable position.

If a radio is fitted, never let it distract your attention.

Stop engines before servicing or fuelling machines.

Take special care should it be necessary to make adjustments with the engine running.

Apply brakes, lower blades, scoop bowls and attachments before leaving machine.

Fuel and Fire.

Stop engines before fuelling.

Keep naked lights and fires away from fuel.

When re-fuelling, avoid spilling fuel.

Keep a metal to metal contact between the filling hose, or can and the fuel tank.

Check for leaking fuel which may be a fire danger; have any faults repaired.

If re-fuelling with cans, keep them clear of battery terminals.

Keep on the tractor a fully-charged fire extinguisher of the type required by law.

Comply with the law in the fitting of spark arrestors. Keep the arrestor cleaned and well maintained and, if necessary, be prepared to replace it each season.

Do not throw matches or cigarette butts to the ground. Put them in a suitable container.

Starting.

Read the makers' instruction books and become familiar with the machine controls and instruments. Follow the maker's advice.

Place all controls, gear levers, and power take off in the neutral position before starting the engine.

Use the self-starter from the seat. If it is necessary to start by the crank handle, keep thumb on the same side of the handle as the fingers and pull upwards.

Don't run the engine in a closed shed. Carbon monoxide in the exhaust gases has neither colour nor smell, but can kill in an enclosed space.

Brakes.

Keep brakes adjusted; see that the brakes on both wheels are adjusted evenly on a wheel tractor.

Fit independent brakes on trailers.

Always latch the brake pedals together when driving the tractor in high gear.

Apply and fasten brakes before leaving machines.

Reversing and Turning.

When reversing, be sure your vision is never obscured.

Watch out for children.

Reduce speed before making a turn or before applying the turning brakes.

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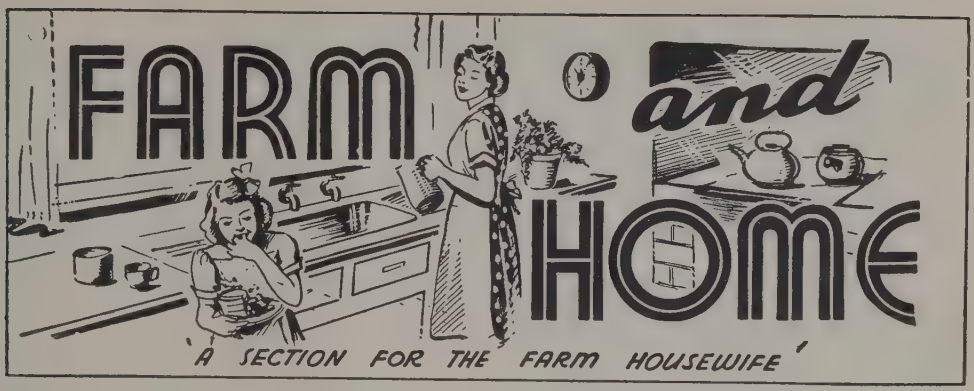


Some Novel Christmas Decorations

By BRENDA CLEEVE

CHRISTMAS decorations can be quite an expensive item and could place extra strain on an already over-taxed budget, but some attractive novelties can be made very cheaply by anyone willing to devote a little time and trouble.

Pine-cones, gum-nuts, banksia nuts and other types of bush vegetation plus a small quantity of plaster-of-paris or patching plaster can be combined with odds and ends of ribbon, holly leaves, candles, miniature dolls, etc., to produce delightful effects.

PREPARATION

Wash the cones or nuts in hot water to remove mud and dust. Trim off any unsightly portions, then rinse in fresh water and stack to dry with the tops downward to facilitate draining.

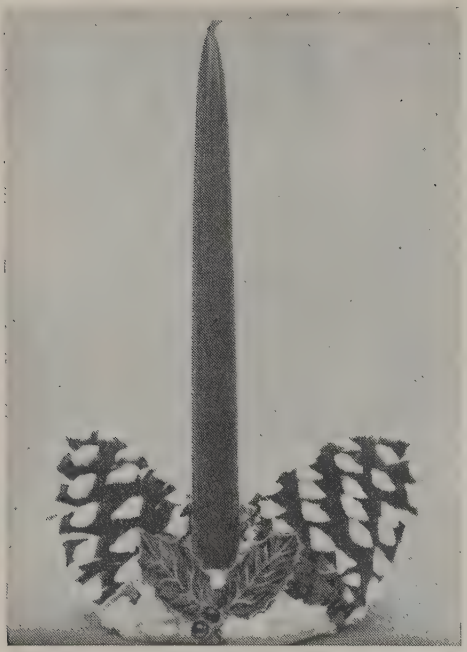
When dry, attach a loop of twine or string to the base of each cone to give added support when they are set in plaster.

TIPPING

To simulate snow, the tips of the cones may be coated with a thin solution of plaster—or a similar effect may be obtained with white paint in which case a matt-finish paint is preferable.

If plaster is used, it should be mixed to the consistency of thick cream in an old plate so that there is about a half-inch depth of plaster. Hold the cone by the

Three pine-cones, some imitation holly leaves and a ribbon bow are used in this attractive table decoration



Two pine-cones, a holly spray and a coloured candle

ends and rotate it in the plaster till the tips are suitably coated. Paint can be applied in a similar manner or a brush may be used.

While the plaster or paint is still tacky, it may be sprinkled with tinsel "glitter" material for added effect.

The treated cones should be hung on a wire or clothes-line by pegging the loops, and should be left until thoroughly dry.

ASSEMBLING

Make a few trial groupings of the treated materials before commencing to assemble them. Various types of Christmas decorations can be used, including coloured ribbons, cellophane, holly-leaves, small fairy dolls or Father Christmas figures. Coloured candles lend themselves to some attractive groupings.

Having decided upon a suitable design, mark out the base on cardboard or thick paper and cut to shape. Prepare a stiff plaster mixture and spread it about ¼ in. thick over the base. It need not be put on smoothly—a rough finish is quite attractive.

Now take each cone separately and push the wire or string loop into the plaster then pack the base with more plaster so that it stands firmly in position. When the main items are in position, tidy up the plaster neatly to give a pleasing shape.

Bows of ribbon or cellophane may be attached by pins pushed into the plaster while it is still damp but not wet enough to stain the material.

Candles, dolls, etc., may be pressed into the plaster while it is still soft. Suitable twigs may be coated with plaster and adorned with paper flowers, leaves or strips of tinsel. Small models of pine-trees can be cut out in cardboard or wood and the little china figures obtained cheaply at chain stores can be used to good effect.

Put each group aside until the plaster has dried and hardened, then, if necessary, touches of colour may be applied using quick-drying enamels.

Attractive wall-plaques, hanging ornaments, or decorations for the table or mantlepiece may be made in this manner and you will get much satisfaction from exercising your creative powers and giving full rein to your imagination.

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PHALARIS TUBEROSA AS A PASTURE GRASS

By F. E. RYAN, Agrostologist

A BROAD-LEAFED pasture grass of value in Western Australia is Phalaris tuberosa. It is sometimes known as Toowoomba Canary Grass because the early development of it occurred from plants in a botanical garden in Queensland. Americans refer to this grass as Harding Grass and strains are known to occur freely throughout the Mediterranean region.

In this State some Phalaris stands have been in existence for a considerable period, but generally this valuable grass has been overlooked by most dairyfarmers in the high rainfall regions.

Phalaris is a perennial, i.e., it survives over summer as a root-stock and commences growth during the autumn, producing new leaves from buds at the base of the old leaf-stalks. It is one of the first grasses to commence growth in autumn, sometimes even before the first rains, apparently obtaining moisture from dew and deeper soil zones. Winter and early spring production is good and it makes vigorous growth before sending up seed-heads in the late spring. It will remain green for several weeks after annual plants have died off, and if soil moisture is available will grow during December and even January.

Phalaris is very drought-resistant and once established will survive very dry summers. For this reason it can be sown on hillsides and on sandy soils which tend to be too dry and too hot for perennial ryegrass.

It is also capable of growing in water-logged conditions and is sometimes sown on flat areas which become inundated for a short time during the winter months.

One of the main reasons for the small area sown to Phalaris is difficulty in establishment. The young seedling plants are weak, and suffer from competition from annual plants, even from subterranean clover in the young stages. For autumn establishment, a good weed-free firm seed-bed is necessary, and sowing should be done in early autumn so that the plants will become deep-rooted before the wet, cold winter months. It is usually necessary to prepare beforehand for this, and an autumn or spring sown crop in the previous year will serve this purpose. Seed-bed preparation can then be done early.

Some recent trials have shown that Phalaris can be sown in the spring in most districts. The pasture on the paddock can be used for grazing until the beginning of August; plough early in August to destroy weeds before they flower; cultivate and sow with Phalaris during the third or fourth week of August. In later districts September planting may be successful. Phalaris will grow rapidly from spring planting.

The recommended rate of seeding is 2 lb. per acre, and this will provide plenty of plants for filling the pasture. If more are sown they will tend to compete with themselves and the final number of survivors will depend more on soil fertility and climatic conditions than on the seeding rate. Likewise, a very well prepared seedbed is much more important in obtaining a good stand than the seeding rate.

Once established, and after the first year, Phalaris is a very tenacious plant. It can withstand harrowing and grazing without any severe reduction in plant numbers, in fact discing, or even mouldboard ploughing of an old Phalaris stand will thicken up the stand by breaking up roots into several parts and transplanting them.

It responds to applications of fertiliser and direct responses to the application of potash have been noticed on deficient paddocks. A vigorous subterranean clover growth amongst the Phalaris would increase, soil nitrogen which Phalaris needs.

Occasionally disappointing results are obtained, even though sufficient plants have become established. This may be due to the use of inferior seed. South Australian certified Phalaris is recommended and excellent results have been obtained by using this line of seed. A great deal of work has been undertaken in recent years with Phalaris strains and a large number of these are under test. Items which are important are seedling vigour to overcome this early competition and ability to persist and produce under grazing. Two strains which have shown early promise are an American one known as C.P.I. 1305 and Denmark, which was selected locally at Denmark Research Station. Another local selection which appears quite promising was taken at Donnybrook.

From a group of approximately 90 strains which were introduced from various parts of the world, the six best of these have been selected over several years, and these will be tested further under grazing.

There is scope for an expansion of the area sown to Phalaris in the South-West and, with the development of Pasture Improvement Groups, a general increase in pasture-consciousness has arisen amongst our farming community, and the area sown with this valuable grass is now increasing.

Book Review

FERTILISERS FOR THE FARM AND GARDEN

Two outstanding and well known agricultural scientists with wide experience in the technical, and teaching aspects of fertiliser usage have collaborated in the authorship of a book entitled "Fertilisers for the Farm and Garden" which should make interesting and profitable reading for farmers, orchardists, gardeners and scientists.

This book should have an especial appeal to local readers because one of the authors, namely Professor L. J. H. Teakle, Professor of Agriculture at the University of Queensland, played a prominent part in agricultural research in Western Australia and was well known to farmers and in scientific circles here up till 1947 when he left the W.A. Department of Agriculture to take up his present position. Those who know Professor Teakle well, will recognise throughout the book many examples of his ability to provide enlightened technical advice in a form acceptable to the layman. The other co-author is R. A. Boyle, M.Sc., who has had long experience as a technical advisor in the fertiliser trade.

The main aims of the book are to present the case for the scientific use of fertilisers, to show how to improve yields and to indicate methods of improving soil fertility. Fertiliser production is now a major industry. Generally responses to fertiliser in Australia have been spectacular. Consequently there is a demand for enlightened advice on fertiliser usage on the basis of the latest existing information and this book has very successfully attempted to fulfil these requirements.

The subject matter covered includes the development of fertilisers in agricultural practice, soil and plant interrelations, the assessment of fertiliser requirements, types of fertiliser, application of fertiliser, fertiliser reaction in the soil, fertiliser experiments in Australia, fertiliser usage in Australia, diagnosing soil deficiencies and fertiliser recommendations for farms and gardens.

Some of the highlights that should appeal to the local man on the land are the constructive comments on the limitations of soil analysis, the wide use made of the results of local experiments to illustrate general principles and the stressing of the practical advisability of maintaining "humus" supplies in gardening if the best results are to be obtained from added mineral fertilisers.—L.T.J.

"Fertilisers for the Farm and Garden" by L. J. H. Teakle and R. A. Boyle. Published by Angus and Robertson in the Agricultural and Livestock Series. ***Price £3 3s.***

Snakebite

As the Cause of Death in Animals

By F. C. WILKINSON, B.V.Sc.,
Veterinary Surgeon

Fig. 1.—The common Death Adder

SNAKES, which are plentiful throughout Australia, are frequently blamed for losses of livestock but there are few proven cases of snakebite causing death in farm animals. The reasons for this will become evident from the following description of the common venomous snakes, their habits and the effect of injected venom on animals bitten.

In order of deadliness, the common venomous snakes in Western Australia can be grouped as:—

1. Tiger Snakes.

These are responsible for the most bites and possess one of the world's most potent venoms.

2. Death Adders.

These are the snakes most likely to be trodden on, are the swiftest-striking and have the most perfect biting mechanism.

3. Brown Snakes.

These are the most aggressive, and have venom least affected by present anti-venenes. Fortunately the venom is not as deadly as that of the first two groups.

DESCRIPTIONS

The Tiger Snake, which is by far the most dangerous reptile of the South-West of Western Australia, can at once be recognised because of its broad head, stout body form and distinct colouration. It grows to five or six feet in length and is dark steel-blue or blackish, with or without a large number of narrow pale orange-yellow cross-bands. The under-surface is for the most part, a pale orange-yellow, In distribution, Tiger Snakes are mainly confined to south of the Moore River and inland to the Great Southern Railway and Stirling Ranges, although some have been found around Esperance. These snakes prefer damp situations where frogs, their common source of food, abound. They have at times also been known to eat lizards and small birds.

The Common Death Adder and the Desert Death Adder are the only two small venomous snakes (less than three feet in length) which are dangerous to animals. Before anti-venene was available for treatment, 50 per cent. of the bites from these snakes were fatal. Both the Common Death Adder and the Desert Death Adder can immediately be recognised by the broad, triangular head, slender neck and stout body. The Common Death Adder is usually nearly three feet in length, greyish, brownish or reddish in colour with numerous darker cross-bands.

It is to be found in nearly any part of the State, but, due to its nocturnal habits,

Fig. 2.—The Tiger Snake

is rarely seen except in the early morning when it may seek the sun, or when disturbed from its hiding place.

The Desert Death Adder is always less than two feet long and is usually reddish in colour with numerous darker cross-bands. Its distribution in Western Australia is confined to the interior and north of the State.

The Large Brown Snakes with their infinite colour variations are difficult to differentiate into species.

The Dugite and Gwardar, which are the main venomous species are both over five feet long when fully grown. They are quite slender with a small head and no distinct neck separating the head from the body. Their colours vary considerably, ranging from olive-green and grey to various shades of brown, often with a red or orange tinge. The colouring of the Dugite is often rather sombre when compared with that of the Gwardar, which is usually a much brighter colour. Both usually have a yellow under-surface.

The Dugite and Gwardar are commonly found on the Swan Coastal Plain and in the wheatbelt. Because they are very fond of mice they often enter sheds and even houses in search of their prey.

THE SERIOUSNESS OF SNAKEBITE

The kind of snake is only one factor deciding the seriousness of any snakebite. Many other factors such as the amount of venom injected, the body weight of the animal bitten, the location of the bite on the animal and the toxicity of the venom, play an important part in deciding whether the bitten animal dies or lives. Even in two snakes of the same kind and comparable size, the toxicity of the venom may vary considerably.

Because the dose of venom causing death is based upon the quantity of venom per pound of body weight of the bitten animal, horses and cattle seldom die as a direct result of snakebite, although lack of medical attention may result in serious secondary infections at the sites of the puncture marks. Pigs, for a reason unknown, do not suffer such marked ill-effects from snakebite as other animals of comparable size. The death-rate from snakebite is definitely higher in dogs than any other farm animal. The reasons for this are that dogs commonly attack snakes, and unless very alert they can easily be bitten. Also, due to the relatively small weight of the dog, the amount of venom injected is often sufficient to cause death where the same dose in a larger animal would not necessarily be fatal.

SYMPTOMS AND DIAGNOSIS

Rarely is the offending snake seen, except in the cases where a dog attacks a snake and is bitten during the ensuing battle. To add to the difficulty of discerning whether an animal has been bitten, the presence of hair, in many cases obscures the typical fang-marks. A close examination however, should reveal two large fang punctures in the skin with a few smaller ones in front or behind. In some cases, oozing of blood from the skin

Fig. 3.—The Dugite, one of the common types of brown snake. This specimen has expanded its neck prior to striking. Normally, the head and neck are approximately equal in thickness

punctures is noticed, whilst the area around the bite marks is usually swollen.

Soon after an animal is bitten, there is excitement and restlessness due to the local pain produced by the fangs and the venom. After this period of excitement, the animal appears normal then gradually becomes depressed and quieter. Incoordination of movement is observed until the animal is not able to stand, and lies on its side completely paralysed. At this stage, the skin is pale and cold, the pupils of the eyes are dilated and the animal does not respond to stimuli such as pinching or pricking. Muscular twitching and convulsions similar to those seen in strychnine poisoning are often seen just before death.

Horses have been known to die within 48 hours after having been bitten, whilst sheep and dogs usually die within 24 hours.

TREATMENT

In the mediaeval period, the traditional treatment for snakebite was a preparation containing the flesh of snakes. From this single ingredient the prescription grew to contain up to 57 constituents during the height of the Roman Empire. By the 15th century this prescription contained 110 items, which were certified as vital ingredients by physicians and pharmacists.

Today, successful treatment depends mainly on the use of anti-venene, a specially-prepared product to neutralise the venom injected by the snake. This anti-venene if given early enough neutralises the venom in the bloodstream before it has a chance to destroy the blood cells or to attack the central nervous system. A minimal initial dose of 3,000 units is required for dogs and although direct injection into the bloodstream is preferable, it is of value if injected under the skin.

The normal human first-aid methods of a ligature between the site of the bite and the heart, incision of the site of the bite with washing out of the incised area, are only recommended in the first few minutes after the bite, and then only if veterinary assistance cannot be obtained. Failure to perform these procedures does not affect the outcome if anti-venene is administered.

In acute cases, supporting treatment with calcium borogluconate injected under the skin may assist recovery. The dosages are similar to those used in treating milk fever. That is in cattle and horses, a mixture of 2 oz. of calcium borogluconate and $\frac{3}{8}$ oz. of boric acid in a pint of water is given. For sheep, one-fifth of this quantity is required and for a dog about one-tenth of a pint only should be injected.

Finally to assist recovery, the animal should have access to as much fluid as possible. The addition of glucodin to the water in the case of dogs is also advisable.

CHESS

is a game requiring skill, great concentration, clear thinking and careful planning . . . . . .

Chess dates back to the 7th century but its origin is debatable and has, at various times been attributed to the Persians and the ancient Hindus. It has been the subject of a most extensive literature and it is on record that Ivan the Terrible died (1584) while playing chess . . . . . .

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WOOLBRANDING of SHEEP

How to Obtain the Best Results

By Officers of the Sheep and Wool Section

LEGISLATION to enforce the compulsory woolbranding of sheep in Western Australia was introduced at the request of farmers' organisations in 1952. It was felt that the woolbrands would serve as a means of readily establishing ownership of lost or strayed sheep and would act as a deterrent to sheep-stealers.

With the exception of registered stud animals and lambs under six months old, all sheep in the following areas must bear registered woolbrands:—

(a) The road districts of Dundas, Esperance, Westonia and Yilgarn.
(b) The South-West Land Division of the State.
(c) Such parts of the Lake Grace, Merredin, Narembeen and Phillips River road districts that are outside the South-West Division.

Woolbranding of sheep outside the areas listed above is not compulsory except when the animals are moved off the run; for instance, if they are travelled, sold or offered for sale.

Observations made at a number of saleyards indicate that many woolbrands are smudged and illegible so that much of the protection they should confer is being lost.

Sheep must be branded to conform with the regulations, and it costs just as much in time, labour and material to apply a smudgy, illegible brand as it does to do the job properly.

In this article we hope to indicate how woolbranding can be carried out so as to give the best results—clear, legible brands that are a definite advantage to the flock-owner.

BRANDING FLUIDS

The first step is to use the correct branding fluids. Under the regulations gazetted on May 25, 1955, it is an offence to use other than SI-RO-MARK scourable branding fluids which are prepared according to C.S.I.R.O. formulas and approved by that body. The word SI-RO-MARK on the cointainer is an indication that the branding fluid measures up to these requirements.

In past years, serious losses to the wool industry have resulted from the presence in Australian clips, of wool branded with substances which could not be removed by the normal wool-scouring processes.

C.S.I.R.O. research workers recently evolved a branding fluid which can be completely removed in the scouring process. This is only marketed under the name SI-RO-MARK.

It is available in blue, red and green colours and is the only woolbranding fluid which may now be used.

No black woolbrands are permitted under the Brands Act regulations.

TYPE OF BRAND

Registered brands consist of two letters and a numeral placed in line and not joined together. The arrangement of the letters and numerals and the position of the brand are determined by the Registrar of Brands in allotting the brand to the flock-owner.

The branding tool should preferably be made from $\frac{1}{8}$ in. round iron with the letters well spaced—at least $\frac{3}{4}$ in. apart—to prevent blotching. Letters not less than 3 in. high have been shown to give clear distinct brands, and the branding tool should not measure less than 7 in. across the portion which comes in contact with the sheep.

A satisfactory branding tool can be made from 8-gauge fencing wire if the letters are carefully shaped and joints neatly brazed. Such a branding tool, if dipped directly into the fluid for each sheep will make a clear mark on the tip of the staple.

Stencil brands have proved unsatisfactory and should not be used.

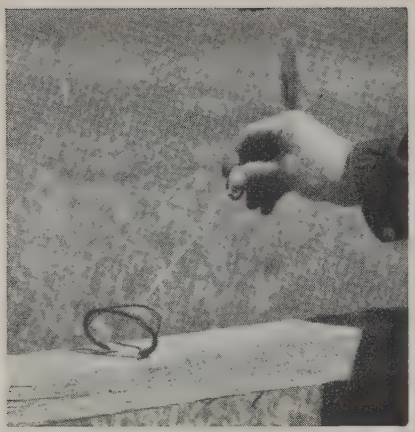

Fig. 1.—A branding tool made of ⅛in. round iron. This is a single letter "C" used in test branding and is not a registered brand

A common procedure in the past was to keep a saturated pad of felt or sheepskin pelt in the branding tin and to press the branding-iron on to this before applying it to the sheep. There is no need for any form of pad when using SI-RO-MARK. The best method is to dip the iron directly into the fluid.

APPLYING THE BRAND

Sheep can be branded with much greater ease and efficiency if they are held firmly in a narrow race.

The ideal is a race 2 ft. 6 in. wide situated near the counting-out pens but a drafting-race, if long enough, is fairly satisfactory and is certainly preferable to chasing sheep around a yard.

Apart from branding, a narrow race is always useful on a farm for mouthing, culling and general inspection work.

Watch the brands carefully and check any faults as they occur. Pack the sheep well into the race so that they cannot move far; make sure that the branding tool carries plenty of fluid; apply it with a quick, firm pressure and remove cleanly without smudging.

For convenience in branding, start at the top end of the race and work down to the other end. As soon as the sheep in the race are all branded, release them immediately so that they do not smudge one another's brands.

Correct application, which is so important for satisfactory branding, involves the following steps:—

(1) Shake the can before use.
(2) If the fluid is too thick, warm gently by standing near the shearing engine or by placing in a can of hot water.
(3) Apply by dipping the iron directly into the fluid.
(4) To prevent rubbing of the brand do not keep the sheep penned after branding.

After each day's branding is completed, clean the branding tools thoroughly, pour any surplus fluid back into the container and replace the lid firmly.

Fig. 2.—This photograph of sheep newly branded with the test brand, shows how the ⅛in. iron gives a clear brand with an impression about ½in. thick

LIBRARY SERVICE OF W.A.

BOOKS... *for FARMERS*

THE following books on agriculture, recently published and obtainable to order from most booksellers, have been added to the stock of the Library Board of W.A. and may be borrowed freely from any public library associated with the board, or consulted at the State Library of Western Australia.

GENERAL

BETTER PLANTS AND LIVESTOCK. [Proceedings of the conference organised by the Australian Institute of Agricultural Science (W.A. Branch) and the Farmers' Union of W.A., held at the University of Western Australia, February, 1958.] [Perth, 1958.]

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FARM MANAGEMENT ECONOMICS, by E. O. Heady and H. R. Jensen. Englewood Cliffs (N.J.), 1954.

FARM RECORDS AND ACCOUNTING, by J. A. Hopkins and E. O. Heady. 4th Ed. Ames (Iowa), 1955.

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LAND RECLAMATION, by P. J. O. Trist. Lond., 1948.

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AFRICAN PYRETHRUM. [African Pyrethrum Technical Information Centre, Ltd.] [Nakuru, Kenya Colony, [195?].

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NOTES ON COCOA IN SOME COUNTRIES OF SOUTH-EAST ASIA AND THE PACIFIC. Ceylon, Hawaii, Thailand, Malaya, Papua, and New Guinea, the Fiji Island Group. Prepared for Cadbury Brothers Ltd. by D. H. Urquhart. Bournville, 1957.

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STATISTICAL BULLETIN. The Fruit Growing Industry, Australia, No. 13; Season, 1956-57. Issued by the Bureau of Census and Statistics, Australia. Canb., [1958].

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BLOODSTOCK BREEDING, by *Sir* Charles Leicester. Lond., 1957.

BREEDING AND IMPROVEMENT OF FARM ANIMALS, by V. A. Rice, F. N. Andrews, E. J. Warwick [and] J. E. Legates. 5th Ed. N.Y., 1957.

BREEDING METHODS FOR CATTLE, PIGS AND POULTRY IN THE UNITED STATES, INCLUDING INTERSTATE CO-OPERATION. Project No. 253 of the European Productivity Agency of the Organisation for European Economic Co-operation. Paris, 1957.

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ORGANISATION OF CONTROL OF WARBLE FLY INFESTATION IN CATTLE. Project No. 205 of the European Productivity Agency of the Organisation for European Economic Co-operation. Paris, 1957.

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ROBERT BAKEWELL, PIONEER LIVESTOCK BREEDER, by H. C. Pawson. Lond., 1957. Part 2, pp. 101-181, consists of the Bakewell letters.

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CHOCOLATE DRIED FRUIT CRUMBLES

- 4 oz. butter or margarine
- 4 oz. sugar
- 2 tablespoons milk
- 5 tablespoons powdered milk
- 1 tablespoon cocoa
- Few drops vanilla
- 1 teaspoon sherry (optional)
- 1 cup coconut
- ½ cup Sultanas
- ¼ cup Currants
- ¼ cup Seeded Raisins
- 2 cups Cornflakes

METHOD

Place the butter, sugar and milk in a saucepan and stir till dissolved. Pour into a basin and sprinkle on the powdered milk. Beat until well blended and add the cocoa. Add the vanilla and sherry. Now work in the coconut, dried fruits and lastly, the cornflakes. Place small heaps on greaseproof paper and chill until set in the ice chest or refrigerator.

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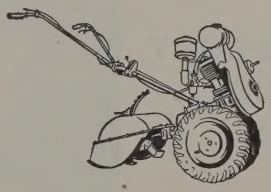

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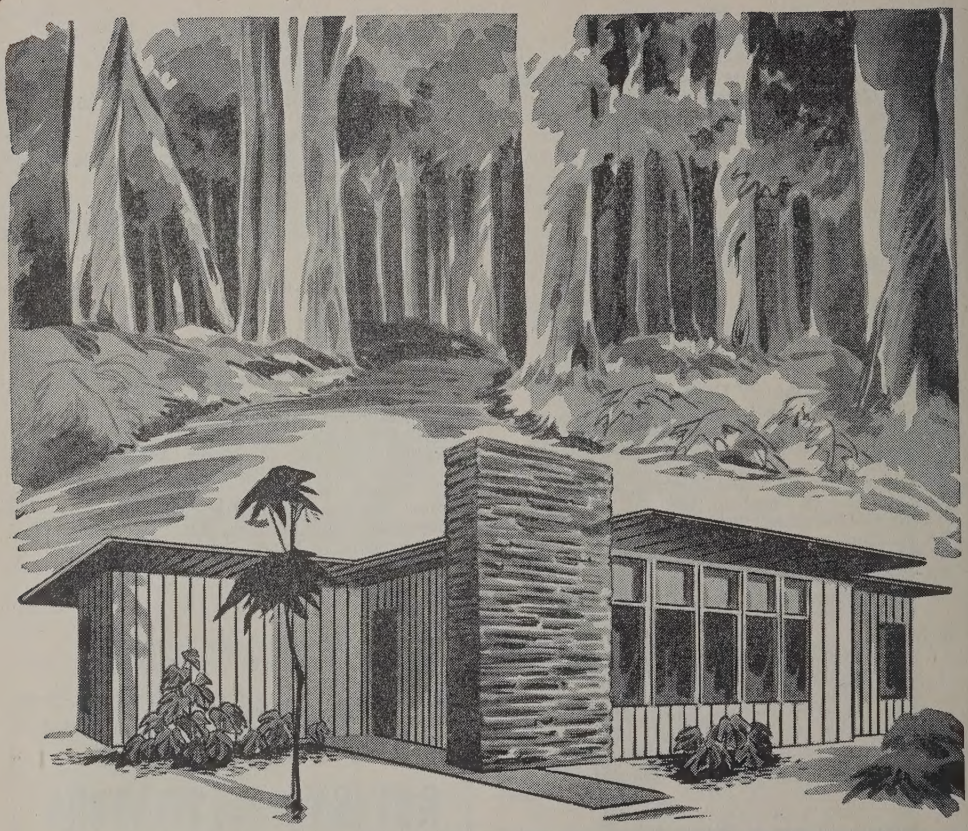

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